# Institutional Complexity in Schools: Reconciling Clashing Logics Through Technology?

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## Abstract

The article analyses the introduction and use of an IT platform in two Swedish schools. The aim is to examine the role of information systems in shaping institutional complexity, and the research questions addressed are: what logics are manifested through the use of the system and how do they interact with each other in relation to teachers' emerging work practices? The article is based on a qualitative case study of how teachers and principals perceive and use the system, and it combines theoretical thinking on institutional logics and complexity with ideas on materiality and its role in organisational change. An analysis of three teacher practices that are emerging with use of the system enables a discussion of the presence and, notably, interplay of three primary logics. Logics of professionalism, bureaucracy and management are shown to interrelate in competitive but, primarily, cooperative ways. The very materiality of the IT system is shown to attenuate experiences of incompatibilities between logics and facilitate the management of different logics when they are actually perceived to be incompatible. Contrary to what much previous literature on institutional complexity in the field of education suggests, we therefore argue that institutional complexity may facilitate and enrich teachers' practices instead of merely constituting a hindrance.

## Introduction

It is increasingly acknowledged that certain domains in society are characterised by institutional pluralism, or even complexity, with the implication that multiple logics guide how to think and act (Greenwood et al. 2011; Kraatz & Block 2008). One such domain is the field of Swedish education, where teachers and principals are struggling to reconcile demands stemming from professional values, the presence on a competitive market, and rules stipulated and overseen by the state (Alvehus et al. 2019; Blomgren & Waks 2017; Lundström & Parding 2011). Overall, the field has been researched fairly extensively. Several studies have analysed one or more of the reforms that have taken place in the field in recent decades (Alvehus et al. 2019; Blomgren & Waks 2017; Börjeson et al. 2017; Carlbaum 2016) and how they have come to shape its institutional complexity. Following the municipalisation reform (1991) where the state decentralised the provision of education to the municipalities, the independent school reform (1992) and the school choice reform (1993), Swedish schools have been subject to increased marketisation (Blomgren & Waks 2017). Various forms of government control have subsequently been (re)introduced: the

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instigation of a School Inspectorate, quality reporting, a more detailed curriculum and an extended Education Act, adding elements of bureaucracy. There have also been reforms aimed at strengthening the teacher profession: new teacher degrees and requirements for a teaching licence (ibid.). Taken together, these reforms reflect at least three dominant ideas, or institutional logics - market, bureaucracy and profession - and have generated pressures related to competitiveness, goal attainment, efficiency and teaching quality. These pressures sometimes contradict each other (Jacobsson & Svensson 2017; Lundström 2015; Madestam et al. 2018), as manifested in, for instance, teachers' experiences of being torn between two different foci for their work: selling an attractive service (which entails branding and marketing activities) and educating (drawing on pedagogical ideas for pupil learning) (Lundström & Parding 2011). Another example is the development of grievance procedures for school shortcomings and degrading treatment, which entails a focus on individual pupil rights at the expense of collective democratic participation in parental boards, student councils and the like (Carlbaum 2016; Englund 1996).

Institutional logics "shape and constrain the behavioural repertoire of social actors" (Friedland & Alford 1991: 248) as they provide rules for action and interaction (Thornton & Occasio 1999). Logics shape individual and organisational practices because they constitute "sets of expectations for social relations and behavior" (Goodrick & Reay 2011: 375), and they come with both symbolic and material elements. Research was initially directed primarily towards the symbolic elements of logics, focusing on core institutionalised ideas and their impact on organisational life. However, following the material turn in social sciences (Boxenbaum et al. 2018; Carlile et al. 2013), the role of artefacts and objects in carrying, stabilising and challenging ideas and values has been increasingly acknowledged (Arjaliès & Bansal 2018; Raviola & Norbäck 2013). Institutional scholars have called for more research in that direction (Cloutier & Langley 2013; Lindberg 2014), for while material elements such as structures and routines have been found to play a role in the micro-level emergence of and change in institutional logics, materiality in terms of objects has been largely neglected. This is despite the growing recognition that material objects can be expected to embody (Labatut et al. 2012) and reinforce (Tryggestad & Georg 2011) logics and, furthermore, influence how logics are performed in practice (Cloutier & Langley 2013). Meanwhile, scholars with an interest in digitalisation have recognised the explanatory value of institutional logics when investigating how a technology with a particular materiality is perceived, practiced, stabilised and modified (Federspiel 2015; Hultin & Mähring 2014; Mangan & Kelly 2009; Oostervink et al. 2016). There is thus growing awareness of the link(s) between institutional logics and materiality. However, research on the topic is still at an emergent stage and, in particular, has devoted scant empirical attention to the role of material objects in shaping institutional complexity, i.e., the relationships between multiple logics (see Lindberg 2014 for an exception).

A salient example of material objects in the school context can be found in ongoing digitalisation initiatives. Schools are currently being showered with digitalised ventures aspiring to enhance learning, democratise education and even ensure Sweden's position as a leading tech nation. Initiatives such as one computer per pupil have become popular since the turn of the century (Islam &

Grönlund 2016), and in 2017 the Swedish government issued a "National digitalisation strategy for schools". The strategy outlines digitalisation as vital to equal education and as an unquestionable element of work in schools. Following this strong digitalisation imperative, ICT has come to play an important role in teachers' everyday work. Whereas pedagogical opportunities and drawbacks in the use of laptops, social media and smart boards in the classroom have been extensively studied (Ertmer et al. 2012; Hatakka et al. 2013), surprisingly little attention has been directed at understanding how ICT influences teachers' practices and, ultimately, the institutional complexity in which these practices unfold.

The rationale behind this article is therefore twofold: advancing the theoretical debate on institutional complexity and materiality, and doing so with regards to a practice where little is known about the impact of ICT. *The aim of the article is to examine the role of information systems in shaping institutional complexity*. In order to achieve this aim, we investigate the introduction of a new IT-system, **StarSystem** (fictional name), in a primary and secondary school. The system offers functions for administration, planning, assessment, and communication with pupils and parents. Hence, the system constitutes a more "back-office" case of digitalisation than ICT tools more directly intended for classroom learning (Ertmer et al. 2012; Islam & Grönlund 2016). Furthermore, and in keeping with the nascent scholarly interest in how material objects form part of the *performance* of logics (Cloutier & Langley 2013; Lindberg 2014), we focus on practices emerging through teachers' work in the system. These practices can be seen as the performance of logics, including both material and symbolic elements (cf. Lindberg 2014). The research questions guiding our investigation are: *What logics are manifested through the use of the information system and how do they interact with each other in relation to teachers' emerging work practices?*

## Literature review

As studies combining materiality and institutional complexity are still scarce, we draw on two bodies of research to address our aim. We first turn to the literature on institutional complexity, as it provides ideas and concepts for analysing various facets of institutional logics interplay, i.e., how institutional complexity is manifested, in practice, in our case. Thereafter, we present some recurrent ideas on how materiality can be understood in relation to institutional logics, in order to grasp the role of materiality - in our case an information system - in shaping the institutional complexity.

### Institutional complexity: different logics and their relationships

The study is based in theorising on institutional logics (Friedland & Alford 1991; Thornton et al. 2012). Defined as broad interpretative schemas dominating certain societal spheres, or institutional domains, logics embed and guide individual and organisational interests and worldviews. The influence of logics on ideas, norms and behaviour is strong since they provide actors with social identities as well as a common language grounded in shared understandings of what constitutes appropriate actions, how these are best performed, and what can

be deemed a good result (Meyer et al. 2014). Logics are ideal types (Thornton & Ocasio 1999; Goodrick & Reay 2011; Thornton et al. 2012), hardly existing in their pure shape but rather occurring in various mixed forms, as almost no field can be described as guided by one single logic.

Currently, there is intense scholarly debate concerning organisational experiences of, and responses to, institutional complexity (Vermeulen et al. 2016). For long, institutional complexity was construed as a temporary state of certain institutional settings, hence focusing analyses on conflicting demands emanating from contradictory logics and subsequently resulting in prioritisation of one logic over another and/or a hybridisation between logics (Greenwood et al. 2011; Pache & Santos 2013a; Battilana & Dorado 2010). However, later theorisation has provided more fine-grained analyses, introducing degrees and dynamics of complexity (Smith & Tracey 2016; Meyer & Höllerer 2010). Notably, it has been demonstrated that complexity may be an enduring characteristic of certain fields (Goodrick & Reay 2011; MacPherson & Sauder 2013) and that relationships between logics vary – over time as well as across contexts. In this emergent debate, logics are understood as coexisting in both *competitive* and *cooperative* interaction.

Specifically, logics do not necessarily give rise to conflicting demands and the end-result of complexity is not always a permanent prioritisation between, or hybridisation of, logics. Recent research suggests that logics, and the ways in which they relate to each other, may vary along the dimensions of *centrality* and *compatibility* (Besharov & Smith 2014) as well as evolve over time (Goodrick & Reay 2011). Accordingly, logics can be perceived as more or less pressing depending on whether or not they affect core organisational operations. Further, logics can vary from incompatible – giving rise to strong tensions and necessitating some kind of "conflict resolution" where one logic typically takes precedence over others – to cooperative – implying a "win-win" situation where logics continue to co-exercise their demands over protracted periods of time. Whereas competitive relationships between logics typically result in segmented practices in focal organisations (different practices are guided by different logics), cooperative ones can be either facilitative or additive (Goodrick & Reay 2011). A facilitative relationship is characterised by one logic increasing in strength without a coinciding decrease in other logics, and an additive relationship means the simultaneous influence of several logics, resulting in an increase in the number of demands that must be met. As centrality and compatibility vary from "high" to "low", different degrees of complexity are experienced by organisations.

Whereas the role of organisational actors in enacting and shaping institutional logics and various degrees of complexity has been increasingly recognised in the literature (Pache & Santos 2013b; Värlander et al. 2016; see also the research vein concerned with institutional work, e.g. Lawrence & Suddaby 2006; Zietsma & Lawrence 2010; Smets & Jarzabkowski 2013), the material elements of institutional logics have received considerably less attention. Both early and more recent writings point to the material dimension of logics (Friedland & Alford 1991; Thornton et al. 2012), implying a view of institutional logics and complexity as mirrored in material practices. Hence, by studying material practices, i.e. actors' practices emerging in relation to material

objects, we maintain that it will be possible to discern the workings of different logics - and the role of materiality therein - as they are reflected in teachers' professional work (cp. Goodrick & Reay 2011). We now turn to prior studies that have explored materiality in relation to institutional logics, in order to specify the relation between the social, the material, and the institutional logics at play.

## Materiality and institutional complexity

As stated above, institutional logics involve both immaterial elements (values and norms) and material such (structures and objects). The role of artefacts and physical objects has gained limited attention in the institutional logics literature (Cloutier & Langley 2013), but following the material turn in organisation studies (Boxenbaum et al. 2018; Carlile et al. 2013) there is increasing interest in the role of materiality in embodying, reinforcing and challenging institutional beliefs and behaviours (Hultin & Mähring 2014; Lindberg 2014; Raviola & Norbäck 2013). As argued by Boxenbaum et al. (2018), "complex ideas are defined, made sense of, transported and stabilized through words but also through visual and material artifacts, triggering a range of cognitive, emotional and other responses to novel ideas in and outside of organizations" (p. 598). The literature suggests a number of roles for materiality.

First, artefacts may be seen as *embodying* certain ideas, myths and norms. In studies of information systems, such ideas, myths and norms often reflect virtues of rationality, efficiency, hierarchy and control (Labatut et al. 2012, Oostervink et al. 2016). These virtues constitute what is commonly referred to as the management, or corporate, logic (Thornton et al. 2012) seen in various contexts. There are, however, also examples of information systems embodying ideas such as collaboration, problem-solving and quality enhancement (Hultin & Mähring 2014; Orlikowski 2000), reflecting a professional logic. Importantly, artefacts need not necessarily embody a clear logic, but can still serve to support the performance of a logic that enters a novel context. Lindberg (2014) illustrates how artefacts supporting extant practices (cash registers) help in supporting the practice of a new logic in a supermarket. Arjaliès and Bansal (2018) show how the use of emojis in evaluating financial investments draws attention to a sustainability dimension that the company seeks to accentuate. Hence, materiality may both carry inherent ideas and become the carrier of new ideas as they enter a certain context.

Regardless of whether an artefact embodies or "picks up" and conveys a logic, materiality guides thoughts and behaviour, which may either *reinforce* or *challenge* institutions. As Raviola and Norbäck's (2013) study of the newspaper industry shows, certain material aspects of traditional news production remained relatively unchallenged and continued to inform novel, digital ways of producing news, notably scope and space limits. Another example is Hultin and Mähring's (2014) study of the implementation of a LEAN visualisation board in a hospital, where the board embodied values of LEAN management (collective identification and solving of problems) which were also central to the medical profession, thereby facilitating implementation and reinforcing both logics. Contrarily, Tryggestad and Georg (2011) showed how different artefacts altered the presence and strength of institutional logics, in a construction project. A

design logic emerged through prototypes and drawings that rendered abstract design goals more concrete, and an economic logic gradually developed as budgets were discussed and triggered insights about the need for more commercial areas in the building.

In line with the general view of institutional complexity as being constructed in interaction between material and non-material elements, some of these studies (Hultin & Mähring 2014; Lindberg 2014; Orlikowski 2000) explicitly take the perspective that materiality is intertwined with its social context (experiences, values and, most notably, practices of the users). We adhere to this perspective, meaning that we pay attention not only to the material particularities of the studied information system (screen layouts, buttons, space regulation) but also to the practices that emerge as teachers use the system, to the goals, experiences and understandings underlying these practices, and to how the material and the social intermingle. However, and importantly, these studies (with the exception of Lindberg 2014) on materiality and institutional logics are concerned with how materiality relates to the performance of specific logics rather than to the interaction between logics, i.e., institutional complexity.

The field of education is characterised by profound complexity (Scott & Meyer 1994; Quirke 2013, Blomgren & Waks 2017) due to its multiple stakeholders. These stakeholders include politicians (state/municipal), organisers (public/private), customers (parents/pupils), and teaching staff, and the complexity created through their connection to different institutional logics is perpetuated in individual teaching/learning situations (Goodrick & Reay 2011). While some authors (Lundström & Parding 2011; Blomgren & Waks 2017; Alvehus et al. 2019) have based their analyses on the three logics of the market, the bureaucracy and the profession (Freidson 2001), others (Jacobsson & Svensson 2017) have found the educational field to also harbour logics of democracy and management. The logics used in our analyses will be further explicated and defined in the method section.

Relating the above-described complexity of the educational field to our theoretical framework, logics may form both competitive and cooperative relationships, depending on how incompatible they are and how central certain logics are to core operations. Further, logics are seen as building on both material elements (in our case: screen layouts and buttons of an IT system) and cultural and symbolic elements (prevalent ideas and values). Materiality is expected to embody, convey, reinforce and/or challenge logics, but such influence is enwrapped in social practices guided by organisational norms and values. The resulting material practices will reflect the logics at play and how they relate to each other. Just how relationships between logics evolve, and what role materiality plays therein, is an empirical question that will be addressed in our analyses. By analysing specific teacher practices emerging in relation to a newly introduced information system, we will outline how the materiality of the system shapes the manifestation and interaction of institutional logics specific to the field of education.

## Methodology

To get close to the logics manifested through the use of the information system and how they interact with each other in relation to teachers' work, a qualitative case study of two Swedish schools was conducted. As the majority of studies on institutional logics employ qualitative methods in their analysis (Jones & Lee 2015) such a research strategy is adequate, not least since logics "which are revealed through language, practices, and manifested in symbols and materials, are naturally suited to qualitative data and methods that demand immersion in the phenomenon." (Reay & Jones 2016: 442). To attain anonymity, all units and individuals in the study have been assigned fictional names. The schools - *Primary School* and *Secondary School* - were located close to each other and run by the same organiser: *Education Group*. When initiating the study, the schools were headed by the same principal, and there were plans to merge them into one unit. These plans were later abandoned, but we believed it to be important to cover experiences from both primary and secondary levels and included both schools in the analysis.

Data were generated mainly through qualitative interviews and ICT strategy documents. An element of observation was included, through the authors' participation in a two-day ICT conference organised by Education Group, inviting ICT teachers from all schools belonging to the group. 15 in-depth interviews were performed with 12 respondents, including teachers and principals, but also an Education Group ICT manager and a product manager at StarSystem (see Table 1). Most interviews were conducted by both authors, lasted between one and two hours, and revolved around the use of StarSystem in the interviewees' daily work. The interviews allowed for interviewee thoughts and digressions and unfolded more like conversations (DeFina & Perrino 2011) than as standardised interviews, as interviewees' experiences enriched our theoretical points of departure. On several occasions the interviewees demonstrated on a computer screen how they worked in StarSystem.

*Table 1. List of interviewees*

| Name | Function | Number of interviews |
| --- | --- | --- |
| Bob | deputy principal | 1 |
| Derek | PE teacher | 1 |
| Mary | principal | 2 |
| Mathew | ICT teacher + teacher year 4-5 | 1 |
| Tina | head teacher pre-school class | 2 |
| Tara | teacher year 1-3 | 2 |
| Julie | teacher year 1-3 | 1 |
| Meg | teacher pre-school class | 1 |
| Dennis | ICT teacher + natural science and math teacher year 6-9 | 1 |
| Paul | ICT teacher + Swedish teacher year 6-9 | 1 |
| Frank | ICT manager Education Group | 1 |
| Ted | product manager StarSystem | 1 |

The interviews were transcribed *verbatim* and coded in several steps. Using NVivo, each author performed an initial coding based in institutional logics and material and social dimensions of teachers' work in StarSystem. In this first step, we decided to focus on work related to planning and assessment, as these came forth as central with regards to the use of StarSystem. Furthermore, planning and assessment must be considered central elements of the teacher profession, thus providing fertile ground for multiple logics to emerge.

Using pre-defined categories facilitated intercoder reliability and pending the coding of each interview we discussed patterns found. Our process represents a *pattern matching approach* to studying institutional logics (Reay & Jones 2016), as empirical data on what teachers did in StarSystem, and why, was compared to theoretically derived ideal type logics. Such an approach is based in the identification of ideal type logics and their constitutive elements since the specific logics prevalent in a certain field are not given or fixed, but vary depending on the empirical context of the study (Thornton 2001; Reay & Jones 2016). Ideal type logics are not seen as representing social reality, but as "tool(s) to interpret cultural meaning" (Thornton et al. 2012: 52), and they are selected and defined through connection to established literature (ibid). We started our pattern matching exercise with five logics identified in previous research on institutional complexity in the field of education (Blomgren & Waks 2017; Lundström & Parding 2011; Sebhatu & Wennberg 2017; Jacobsson & Svensson 2017): professional logic, bureaucratic logic, management logic (sometimes referred to as organisation- or corporate logic), market logic and democratic logic. As our analyses unfolded, and as we discovered that market and democratic logics were virtually non-existent in relation to teachers' work with StarSystem, these logics were subsequently excluded.[1] Table 2 outlines the three ideal type logics of the profession, the bureaucracy, and management, together with exemplary quotes expressing each logic. As employed here, each ideal type logic is derived from a clearly defined goal, distinctly separating and distinguishing it from other logics. Whereas the goal of the (pedagogical) professional logic is enhanced learning based in pedagogical expertise (Freidson 2001; Lortie 1969; Alvehus et al. 2019), the goal of the bureaucratic logic is the implementation of political decisions (Lipsky 1980; Fredrikson 2010) and it is based in rule of law (Lundquist 1998; Carlbaum 2016). The goal of the management (or organisation-) logic, in its turn, is the efficient, rational running of operations based in universal models and techniques (Brunsson & Sahlin-Andersson 2000; Löwstedt 2015; Engwall et al. 2016). Our choice to use, and separate between, bureaucratic and management logics, is grounded in the analytical need to distinguish between demands stemming from national regulations, on the one hand, and intra-organisational demands for efficiency on the other (cp. Svensson & Tomson 2016; Jacobsson & Svensson 2017). Accordingly, our understanding of the bureaucratic logic comes close to Weber's (1978) original rational-legal bureaucracy as modelled on German state civil service; it springs primarily from the specificities of politically governed organisations and from the implementation of policy as their *raison d'être*. Separating the bureaucratic logic from the management logic is, hence, the

existence of regulations and governing documents specifying both the prerequisites for, and the contents of, core operations: in our case the Education Act and the National Curriculum. In contrast, the management logic rather pertains to the internal efficiency of schools, cast as rational and bounded organisational entities. This internal focus is also what separates the management logic from the market logic; whereas both logics reward efficiency, the market logic has a pronounced external outlook, focusing on competition and positioning in relation to competitors (Freidson 2001; Friedland & Alford 1991). The management logic is rather centered around internal organisation and the efficient running of operations.

*Table 2. Ideal type logics and pattern matching*

| Ideal type logic | Key ends and means | Exemplary quote |
|---|---|---|
| *Professional logic* | Pedagogical ideas and ideals; benefits to pupils and enhanced learning possibilities | "The main reason that we have talked about doing things similarly is that we believe that it is easier for the pupils to read, to recognise… So we believe that it's easier for the pupil to take in the comment when it looks about the same for different teachers" |
| *Bureaucratic logic* | a) Policy implementation; teachers as civil servants | a) "…you think a bit extra, that you don't just do things but also why we do it… what is the purpose of this, can we connect this to something in the curriculum… so we don't stray too far from the knowledge requirements" |
| | b) rule of law; equality and individual pupil rights | b) "when it comes to grading… it's an exercise of public authority and it must be in compliance with the rule of law, and I feel that this is possible to accomplish in a totally different way now" |
| *Management logic* | Rationalisation and efficiency; formalised models and one-size-fits-all solutions | "we check the subject matrix and see that no, some cells are still yellow relating to certain knowledge requirements and consequently the grade will be D" |

The pattern matching approach is particularly suitable when "changes in behaviour at different points in time can be shown more clearly because of the common referent point [the ideal type]" (Reay & Jones 2016: 448-449). Hence, when behavioural change can be observed, as when new teacher practices emerge through the use of StarSystem, this means that the balance between logics in a particular setting has shifted (ibid). Such a shift can be seen as the point of departure for a comparison between constellations of logics and a theorisation of the mechanisms that drive changes in logics over time (ibid.). In

our case, we use ideal types to identify shifts in the balance and interaction between logics - professional, bureaucratic and management - through focusing on work practices emerging with the introduction of StarSystem.

Hence, a second step in the analysis consisted of - inductively - sifting out new/altered teacher practices emerging through interactions with StarSystem. Identifying such practices was important for understanding the role of the information system in shaping the institutional complexity; in line with the view of institutional logics - and of materiality - presented in the literature section, we see these practices as the enactment of the logics and of the materiality offered by StarSystem (cf. Reay & Jones 2016). Three practices were particularly salient in the planning and assessment work: the pronounced *reliance on the national curriculum*, the *sharing* of content with various audiences, and the efforts to *standardise* content and activities in StarSystem. The final analytical step involved connecting the emerging practices to the institutional logics at play, to the materiality of StarSystem and to the social dimensions surrounding work in the system, so as to understand *how* (cf. Reay & Jones 2016) logics interact with each other in relation to teachers' daily work.

## StarSystem and novel practices in teachers' work

StarSystem is a comprehensive IT solution allowing for any number of functions related to the planning, performance, assessment and analysis of teaching and learning practices. The system was introduced in a stepwise manner, where teachers were required to add more and more functions as they grew more comfortable working in it. Below, we outline the three major practices emerging as teachers used StarSystem for planning and assessment purposes. In relation to each practice, we highlight the institutional logics at play, whereas the very interaction between logics, and the role of StarSystem in shaping such interaction, is more fully addressed in the discussion.

### Using the curriculum as baseline

Teachers from all grades emphasised the imperative to have the curriculum permeate both planning and assessment practices. They seemingly saw the implementation of the curriculum as a key component of their work, and the structure and contents of StarSystem provided a way to perform this task.

> You are dependent on StarSystem and such tools in order to grasp the entire picture [i.e. the vastness and complexity of the new curriculum (lgr11), specifying in detail the core contents and knowledge requirements of each subject], I really do think so. I have a hard time imagining how I would be able to work it out otherwise. (Dennis)

A central feature of connecting plans and assessments to the curriculum was the *weekly planning*. It was posted in StarSystem, explicitly departing from the core contents of the curriculum by way of connecting classroom activities to subject goals. Hence, pupils and parents could see what knowledge requirements would be covered in a particular class or project, as well as a specification of what would eventually be assessed. When doing their weekly planning, teachers could simply choose central contents and knowledge requirements from a menu,

allowing for a clear and systematic connection between their plans and the writings of the curriculum. Tara explained:

> It's really clever, because you just click what subject, what area we are working on. We work with transitions between seasons at the moment and then all the knowledge requirements are there, so you only need to tick those that you work with here, you don't need to write anything. So it's rather comfortable once you get started. You don't need to search in the curriculum, but everything is there and you pick what is suitable. (Tara)

In addition to this efficiency-oriented motivation, mirroring a management logic, Tara, and others, put forth arguments connected to policy implementation, thus resonating bureaucratic requirements:

> ... it becomes clearer, like you maybe think a bit extra, that you don't just do things but also why we do it /…/ what is the purpose of this, what is the reason… or are we doing this just for fun, to go out and collect acorns? But what is the purpose of this, can we connect this to something [in the curriculum], so that it's possible to tick a box, yes we have covered this, so we don't stray too far [from the knowledge requirements]… (Tara)

Turning to assessments, StarSystem aided teachers in making sure all parts of the core contents were covered, and that pupils were assessed in relation to all knowledge requirements. In accordance with the Education Act, assessments, and particularly the assignments of grades, were construed as official decisions, granting every assessing teacher the status of public servant exercising public authority. Taking this function seriously demanded the organisation of work in compliance with the rule of law, and StarSystem was perceived as a guarantor for such compliance. Said Frank:

> we exercise our public authority [through StarSystem] because it is the most safeguarding system we have, and it is also a system that is built for that specific purpose. It is built to correspond to the Swedish national curriculum, with its modules for assigning grades, modules for documenting knowledge development, modules for connecting core contents, aims and knowledge requirements to everyday work in the schools. (Frank)

In relation to that "everyday work in the schools", Dennis made the following remark:

> well, it is an exercise of public authority and it must be in compliance with the rule of law, and I feel that that is possible to accomplish in a totally different way now [with StarSystem] /.../ Because now, when you are constantly registering data in StarSystem, you are constantly reminded of what knowledge requirements to look for [when making assessments], what core contents to cover in class, that is what you focus on and nothing else. (Dennis)

Seemingly, the knowledge requirements were very present in teachers' everyday work. Making assessments in StarSystem, with its rationalised structure resonating a management logic, teachers also enacted a bureaucratic logic that

enabled a (bureaucratised) assessment practice in accord with the rule of law, which was perceived as important by teachers, principals and organiser alike.

## Sharing of contents

Another recurring practice was the sharing of contents, which surfaced in relation to both planning and assessment. In contrast to a previously widespread use of documents on one's own computer, or indeed handwritten notes, StarSystem gathered planning and assessment contents from all teachers in one place, and made it visible to colleagues and principals, and to the pupils and parents concerned. Contents were hence more easily, in some cases even automatically, shared. Two main rationales for sharing contents were discerned: one efficiency-oriented and one professional.

Several interviewees underlined the efficiency gains related to systematic sharing, as well as the problems associated with not doing so, e.g., in case of illness or personnel turnover. Tina outlined what she perceived as beneficial with the new planning function:

> Why should there be five different teachers doing a big planning on space or the body or something within social sciences, natural sciences or mathematics… I know that the lead teacher [teacher with particular responsibility for pedagogical development work] is currently breaking down [content related to knowledge requirements in the curriculum], and that's good, because it's really good to maybe focus on particular areas, that one year maybe I focus on these things and then you have done a few plans and you share them. Then there won't be that much administrative work in the long run (Tina)

It seemed that the organisation of teachers at Primary School further motivated teachers to share plans, as there were two teachers in every grade working in seemingly close collaboration. "… you [Meg] have done Swedish, I have done mathematics." (Tina)

The focus on efficiency could be seen to reflect a management logic, in turn possibly providing more room for a professional logic. However, gains that were more directly related to a professional logic also surfaced. Some were related to the involvement of parents, and their importance in pupils' learning.

> that it [the planning] is there, that pupils and parents see what we need to work with, what we actually work with, and on what grounds they are assessed. And ultimately also tasks, they are also connected to knowledge requirements. (Dennis)

Similarly, Mary stressed the relation with parents when describing her hopes about StarSystem:

> if you know that in history we work with this, that in itself makes it a discussion topic around the kitchen table at home. "Now I see that you talk about the Middle Ages", or whatever it may be. So you get the parents involved in another way, I think. (Mary)

Other professional gains concerned exchanges between teachers leading to pedagogical discussions, and possibly also coherence. Tina saw the potential for identifying how contents could be coherently covered in each grade, and in a similar vein, Tara and Julie talked about the possibility to plan for increasingly

challenging tasks for the pupils, as the planning function clearly visualised what had been done earlier and what remained to be covered. Furthermore, as Tara had recently turned her class over to the next stage in their education she had made a summarising assessment for each pupil that was used in her meetings with the pupils' new teachers, where the knowledge level of the class was discussed:

> you make assessments, because all knowledge requirements are listed for each pupil, and you mark if they have attained them and if they haven't quite attained them there is a box where you write comments, you write "you have yet to attain this and this". For each subject there should also be a future-oriented [comment]; "you need to work more with this, and with this you have worked very well". And then this is passed on to [the pupils in grade four] /.../For them it is probably valuable to get this information. They know what remains to work on. And also the parents can get this information. (Tara)

As it seemed, work with StarSystem had sparked and given momentum to a more collaborative approach to planning and assessment, and pedagogical discussions across subject groups were already taking place among some teachers.

> [StarSystem] is a tool, you can't just let it loose but you have to really talk and work with it, intensively, in the teacher group so that everybody feels that they can handle it /.../ but good pedagogical conversations occur around it, how we use the matrices, how we view these [assessment criteria], because there is discussion - what does 'good knowledge' mean, what does 'relatively good knowledge' mean and what does 'very good knowledge' mean? Even if we have these discussions outside [of StarSystem] too, the system is still our assessment tool. So it becomes a gear that it is easy to gather around" (Mary)

Surprisingly little concern was voiced among teachers with regards to sharing content with different audiences. However, and importantly, teachers pointed to the need for learning sessions in order to realise the perceived benefits of the system. To address such concerns, learning sessions and meetings were organised, where teachers were to share examples of their planning to spread good practices and to evoke discussions of how planning and assessment could be done.

## Standardising - or not?

A recurring concern in interviews was the formulation of plans and assessments. Discussions ensued departing from the worry that – when rendering content visible in StarSystem – too much variation would be confusing to teachers, parents and pupils. Voicing a professional logic, Dennis maintained that a standardisation of planning was needed for the good of the pupils:

> The main reason that we have talked about doing things similarly is that we believe that it is easier for the pupils to recognise, to read… I mean, if you read different types of text you need to adjust the brain in order to grasp that text in a certain way. /…/ So we believe that it's

> easier for the pupil to take in the comment when it looks about the
> same for different teachers. (Dennis)

Even though, on some level, there was agreement on the usefulness of standardisation, it was difficult to achieve in practice, as demonstrated by the recurring meetings and discussions on the topic. Dennis testified to some teachers being "slow in adjusting their old way of writing [plans]", but hoped that continuous discussions would bring them closer to each other. Tara said that "some write a whole lot and some write a little, so we've had a lot of discussions…". She continued: "I don't think that we came to a real decision [on a common template]. … but I think that many prefer to keep it rather brief, because it involves too much work." (Tara)

The importance of agreement in relation to assessment came forth as even more pressing than for planning, although here, arguments rather reflected bureaucratic and management logics. Several interviewees stressed the necessity of guidelines, for how to both *make* and *communicate* assessments, testifying to a view of standardisation as the way to implement the curriculum. For although the curriculum specifies assessment criteria for grades in every subject, these criteria spurred discussions on the "actual" meaning of knowledge requirements as well as the "proper" way to assess pupil performance. As variations were made apparent through assessments in StarSystem, collective interpretations emerged, in turn generating standardisation. As described by Dennis:

> if you solve a math assignment, you can do this in different ways and
> then [my colleague and I] try to look at different solutions and grade
> departing from that, departing from the knowledge requirements /…/
> I believe that since the knowledge requirements are there, in
> StarSystem, as they appear in the curriculum, we work a lot on trying
> to interpret what is there (Dennis)

Furthermore, the very structure of the system seemed to standardise the way assessments were made, through a clear-cut matching of knowledge requirements and individual pupil performance. Each subject had its own matrix, in which the "core contents" and "knowledge requirements" from the curriculum had been divided and categorised. StarSystem came with a ready-made division and categorisation, and all teachers interviewed worked with their assessments through this structure. However, according to the vendor of StarSystem the predefined structure was intended as a "suggestion" (Ted) that could be modified by the individual schools. Neither of the studied schools used this possibility to customise the matrices, but rather saw the suggested structure as given. When asked if it was easy to translate knowledge requirements into assessment criteria, Bob simply responded "the translation is provided by StarSystem", as if the system provided the one and true way to do so.

Hence, each subject matrix contained cells where the different elements of the knowledge requirements were listed together with specified assessment criteria for grades A, C and E, and where teachers ticked the boxes corresponding to each pupil's knowledge level, yielding a colour to the cells in the matrix: green for "knowledge requirement attained", yellow for "towards attaining knowledge requirement" and red for "knowledge requirement not attained". Through this visualisation, a standardised and easy-to-understand picture of the pupil's "knowledge" was hence provided to pupils and parents. In

line with bureaucratic and management logics, some teachers merely "obeyed" this visualisation, assigning the grade generated by counting the number of green cells in the matrix; "we check the matrix and see that, no, some cells are still yellow relating to certain knowledge requirements and consequently the grade will be D" (Paul). However, the standardised "objectivity" of the system could be circumscribed, thus following a professional logic:

> If you are thinking about a specific pupil, he has many C:s and maybe one or two E:s on assignments, and you're thinking about whether he should get the grade D or C. And then you think back, maybe you have some notes from class and see shit [sic!], he did a really good presentation on the whiteboard and raised his hand in that class, and then you can see that he has clearly demonstrated that he reaches the C level. And then maybe the system says that he is on the D level but the teacher has additional knowledge that can push the grade upwards. And there is nothing saying that "my God, that's not allowed", that's our own profession[ality]. We have that feeling. (Bob)

> it is easy to later translate this into a grade, that most knowledge requirements are ticked green on the C level, and it is easy to say, okay there are six green cells and four that are not green, this represents mostly D:s and you assign the grade D. But it doesn't have to be like that, it's up to the individual teacher to weigh the different knowledge parts and see if the grade should be D [or C]. /.../ because things easily become rigid within StarSystem, very much black or white, and then to explain and argue for something else [a different grade]... in order to avoid discussion [with pupils and parents] you delete a couple of these… I am whispering now [as if indicating a secret] … No, but you adjust the assessment for external use. You might have an assessment, internally, but the one you present to pupils and parents, to avoid a strange discussion, in the worst case you adjust it [the assessment in the matrix] a little bit. (Dennis)

This reliance on professional judgements was also mirrored in the complaints about the "one size fits all" promotion of standardised assessment practices, voiced by several teachers. For instance, Tina maintained that assessment was not a core practice for the pre-school class; they rather worked with *documentation* of the children's development and for this purpose StarSystem was not adequate.

> We don't make assessments, we have other needs, needs to publish another kind of documentation /.../ Because documentation is not just written assessments, documentation can be done through imagery and visual communication too. (Tina)

Tara and Julie, working with grades one to three, made basically the same argument in relation to assessments. Although Julie described assessment in StarSystem as "smooth"; you just "click, click and then you have made an assessment", they believed that the function of making assessments was more adapted to the older pupils:

> **Tara**: I think that for the older pupils, those who have assignments to turn in, they can get this formative [assessment]; "you did really great

on this and work a bit extra on this next time". That you can get this kind of [assessment] comments in relation to such assignments. That's where I think it would work.

**Julie**: But if *we* were to do that....

**Tara**: ... it wouldn't benefit the children /…/ Yes. It's a bit more difficult with the young ones in the entire system actually. Most of it is built in relation to older [pupils], I think.

## Discussion

Above we described three teacher practices emerging as StarSystem was used for planning and assessment purposes. To recapitulate, we view these material practices as mirroring the various logics, their relationships and their social and material dimensions (cf. Cloutier & Langley 2013; Lindberg 2014; Reay & Jones 2016). In order to achieve our aim of examining the role of information systems in shaping institutional complexity, we will now discuss these findings in two steps. First, we reason in terms of centrality and compatibility of logics (Besharov & Smith 2014), cooperation and competition between logics (Goodrick & Reay 2011) and possible shifts in these dimensions following the use of StarSystem. Second, when the state of the institutional complexity has been addressed, we discuss in more detail the role of materiality (Cloutier & Langley 2013; Lindberg 2014) therein.

Assuming that teaching and learning constitute core operations in schools, we view the planning of lessons and the assessment of pupils' performance as essential to the achievement of these core operations. Traditionally, *professional logics* have dominated planning and assessment (Alvehus et al. 2019; Berg 2011). With the material practices emerging from the adoption of StarSystem we see continued presence of a professional logic, but also observe other logics playing a central role in core operations (Besharov & Smith 2014). Firstly, a pronounced *bureaucratic logic* can be observed both in relation to the strong reliance on the curriculum, and in relation to the standardisation of plans and, foremost, assessments. Secondly, reliance on the curriculum, together with sharing of content, also bring to the fore a *management logic*, based in rationalisation and efficiency. Whereas the degree of *centrality* is hence heightened, the issue of *compatibility* between the logics involved is more intricate, and will be elaborated below.

Even though goals such as efficiency and rationalisation (management logic) and individual pupil learning (professional logic) might seem quite inconsistent, several teachers testify to efficiency gains – notably in relation to sharing – potentially creating more room for pedagogical discussions and considerations. Our interviewees also point to the pedagogical value of communicating plans and assessments in a standardised way to pupils. Overall, management and professional logics seem to be *compatible* (Besharov & Smith 2014), forming a *cooperative* complexity including *facilitative* elements that support each other (Goodrick & Reay 2011). On the other hand, the implementation of the curriculum (bureaucratic logic) seemingly occurs at the expense of teacher discretion and holistic judgements (professional logic). Granted, the curriculum – being a central regulatory document – has always guided teacher practice, but

teachers used to retain a high degree of discretion when it came to the core activities (Lortie 1969; Berg 2011). In comparison to its predecessor, however, the 2011 curriculum is perceived to guide both planning and assessment in quite some detail, reflecting – at first glance – *incompatibility* (Besharov & Smith 2014) and a *competitive* complexity (Goodrick & Reay 2011) between bureaucratic and professional logics. However, and importantly, many interviewees consider the implementation of the curriculum an important part of their job, expressing relief about StarSystem helping them "not to miss anything", rather than fear that their discretion is lost. Therefore, the relationship between bureaucratic and professional logics can also be seen as *compatible* (Besharov & Smith 2014), forming *cooperative* complexity where the two logics come with *additive* elements (Goodrick & Reay 2011). The compatibility between bureaucratic and professional logics is even more evident when it comes to the standardisation of plans and assessments enabled by the layout of the curriculum in the system, which teachers overall find pedagogically valuable. Simultaneously drawing on the bureaucratic logic of implementing the curriculum and the professional logic of pedagogical ideas and ideals on teaching and learning, the apparent end-result is bureaucratised (in line with the writings of the curriculum) plans and assessments that are still intended to "benefit the children". Also, considering the slow process of forming standards, teachers, to a high degree, retain their discretion in "standardising", presumably furthering the compatibility.

In sum, the emerging material practices reflect a strong professional logic. However, the bureaucratic logic has gained centrality through the easy accessibility of the curriculum in the system, reinforcing a bureaucratic logic that was always present as school policy is decided by politicians and implemented by teachers as street-level bureaucrats (Lipsky 1980). The management logic reflected in both the design and functions of the system, on the other hand, represents goals and values that can be described as rather novel in the field of education (Löwstedt 2015; Jacobsson & Svensson 2017). Both bureaucratic and management logics appear to have gained centrality mainly in cooperative interaction with the professional logic, although competitive interaction is also present – primarily between bureaucratic and professional logics. Having outlined the institutional complexity, as played out through teachers' work in StarSystem, we will now in more detail discuss the role of the system's materiality in shaping these shifts in constellations of logics.

In many regards, the layout and functionality of StarSystem embody managerial values (Labatut et al. 2012; Oostervink et al. 2016), such as rationality (that a rational, and preferably "objective", link be established between core contents, lesson plans, knowledge requirements and assessments) and efficiency (that plans be shared and re-used). In this, StarSystem functions as a carrier of a management logic, reflecting the prominent status of rational management ideals in contemporary society (Scott & Meyer 1994; Engwall et al. 2016). As the system, by its inherent management logic, facilitates the implementation of the curriculum, it could also be seen to embody and carry a bureaucratic logic. Therefore, the reinforced centrality of management and bureaucratic logics discussed above seems rather directly related to specific material properties of the system. Meanwhile, the professional logic comes forth

as a more indirect result of the system. The materiality of the system seems, firstly, to be interpreted as a means to implement the curriculum and to gain time, yet as these practices become established, opportunities for self-reflection, pedagogical discussions and pedagogical communication with pupils and guardians are identified and grasped. This will be elaborated below.

With regards to *compatibility* between logics, we argue that StarSystem contributes both to attenuate experiences of incompatibilities between logics and to manage different logics when they are in fact perceived as incompatible. As discussed earlier in this section, the logics at play appear – overall – to be perceived as compatible although they, at first glance, may seem incompatible. In essence, a practice resulting from the system and connected to management and/or bureaucratic logics typically creates prerequisites for a professional logic, thus diminishing the sense of incompatibility between logics. Efficient and policy-compliant planning practices, based on swift connection to the curriculum, together with sharing and standardisation create more room for pedagogical thinking. Likewise, detailed visualisation of degrees of knowledge in subject matrices sparks collegial discussions concerning interpretations and pedagogical communication. The guiding beacon still seems to be that which "benefits the children", i.e. a strong professional logic. Particular materialities of the system, while not embodying a professional logic, thus serve to sustain such a logic by facilitating the relevant practices (cf. Lindberg 2014).

However, experiences of incompatibility between logics do exist. The system is sometimes described as rigid and as not benefitting the pupils since it confuses more than clarifies. Furthermore, some teachers express concern that the layout of the assessment matrices downplays their holistic judgment. Here, the management and bureaucratic logics embodied in the system clash with professional ideals. Yet, the materiality of StarSystem simultaneously offers some amount of resolution to this incompatibility. Most notably, it does so by "hiding" professional assessments behind the apparent – yet illusionary – objectivity of the subject matrix, i.e., allowing for a *segmentation* of practices related to the different logics (Goodrick & Reay 2011). Accordingly, the very assessment is guided by a professional logic while the communication of the assessment rather follows management and bureaucratic logics.

While the material properties of the system clearly embody certain logics, in turn triggering certain practices and also certain experiences of, and resolutions to, complexity, we also want to point to the limits of materiality – and to the role of surrounding social arrangements. As already touched upon, some practices and experiences emerge as they inform each other in a chain-like manner, rather than as a direct result of the materiality of the system. Another example would be the move towards standardisation; rather than being directly derived from the materiality of the system, this practice (also being the least prevalent) rather follows from the other practices – the use of the curriculum as baseline and the sharing of content – as teachers and principals attempt to handle differences that surface with the use of the system. How novel practices and experiences unfold is conditioned by extant practices and experiences, which may well vary within the organisation (Hultin & Mähring 2014; Orlikowski 2000). Although the management and bureaucratic logics embodied in StarSystem are seemingly sustained through the emergence of sharing and/or standardisation practices,

these are precisely practices, which differ between teachers, or groups of teachers. In particular, standardisation appears as an organic process that had not reached its conclusion. Also, and importantly, norms are primarily developed around the communication of work, rather than in relation to the work itself – e.g. the formulation of assessment comments rather than the actual assessment. In this, we see a potentially growing sense of incompatibility between the three logics – as when an external (bureaucratised) assessment is adjusted following an internal (professional) one. As these matters are not discussed in any collective fora, this incompatibility seems to be experienced primarily by individual teachers. In this sense, the materiality of StarSystem is not accompanied by social arrangements to a sufficient extent; there is no agreed upon problem of complexity, nor any solution. Given the prevalence of this type of system in Swedish schools, and coupled to the strong digitalisation imperative, it might very well be that professional, bureaucratic and management logics are about to enter into a more competitive relationship, perhaps with a new dominant logic.

## Concluding remarks

Returning to our aim, we have examined the role of information systems in shaping institutional complexity. In so doing, we have identified three teacher practices emerging as the system is used for planning and assessment: strong reliance on the curriculum, sharing of content, and standardisation of content. Furthermore, and in accordance with our research questions, we have found that our focal logics (bureaucratic, management and professional) surface in these practices in a chain-like manner and that the logics – overall – form cooperative rather than competitive relationships. With its streamlining and efficiency-inducing interface, the system embodies a management logic, which in turn provides more room and opportunity for bureaucratic and professional logics in teachers' planning and assessment practices. Accordingly, the logics all have central positions in teachers' core practices, yet without generating particularly incompatible demands (Besharov & Smith 2015). Hence, and contrary to what much previous literature on institutional complexity in the field of education suggests (Blomgren & Waks 2017; Lundström 2015, Madestam et al. 2018), institutional complexity may in fact facilitate and enrich teachers' practices (Goodrick & Reay 2011). The material properties of the system seem to play a role not only in evoking novel practices, where the focal logics are brought into coexistence, but also in attenuating experiences of incompatibility - and in managing incompatibilities when they do arise. Our study thus also adds to the emerging scholarly debate around the role of materiality in institutional complexity (Cloutier & Langley 2013; Lindberg 2014) by illustrating how an information system, in a chain-like interplay with collegial values, discussions and extant local practices, may result in cooperative relationships between logics.

Our single case study calls for more research on what similar information systems may hold for institutional complexity in schools, both in terms of teacher experiences and in terms of broader, field-level shifts. Although we have primarily discussed how institutional complexity may facilitate teacher practices,

we have also drawn attention to the risk that such information systems may result in more competitive forms of complexity, something which future research should remain sensitive to.

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## Notes

[1] To be sure, both market (based in ideas on competition, supply and demand and rational consumer choice) and democratic (based in active participatory decision making and citizen equality and civil rights) logics were present in the general school environment, but they did not come forth as salient to the work performed in StarSystem.