Researching teachers' agentic orientations to educational change in Finnish schools

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Abstract

This chapter addresses teacher agency in making sense of an educational change effort within the context of two Finnish schools. In specific, the study examines the display of agentic orientations in the teachers' accounts while they reflect on the uptake of a new digital learning environment, called the FUSE Studio at their schools as part of the adaptation to the new core curriculum. Informed by sociocultural theorizing, the approach employed in this chapter underscores a temporal perspective to researching teacher agency and agentic orientations in the context of an educational reform. The data comprise 23 teachers' semi-structured interviews after a two-day in-service FUSE training program, analyzed using qualitative content analysis. Our analysis revealed four agentive orientations with distinct temporal dimensions of agency that the teachers displayed towards the educational change efforts their schools were undergoing. Namely, *practical-evaluative orientation*, *Reproductive orientation; Critical-projective orientation,* and *Creative-projective orientation* to educational change. These agentic orientations and their temporal features unpack the dynamic processes how teachers manage educational reforms to address their personal and local needs. The chapter concludes by discussing future directions for research on teacher agency in the midst of educational change.

1 Introduction

Recent social, economic, and technological developments are challenging education all around the world. As there are no simple solutions, there is a great deal of debate concerning how schools should be defined and developed in this century to support social justice, as well as students' personal growth and working life skills. Schools and education systems overall are hard-pressed to deal with the often conflicting demands contemporary knowledge societies pose for learning and provision of education (Erstad et al., 2016; Kumpulainen et al., 2011).

In Finland, the demands of the changing society are being addressed in government's key projects, including the introduction of a new core curriculum for preschool and basic education (FNBE, 2014). The new core curriculum emphasises the development of students' transversal competencies including digital competencies, critical thinking skills and learning-to-learn, interaction and expression, multiliteracy, working life skills and entrepreneurship as well as social participation and influence. In addition, the core curriculum recommends learning environments and pedagogies that are based on experiential, integrated and student-centered learning, modeling real-life inquiry and problem-solving with relevant social and material resources. All these changes call for major reforms in the ways in which education has been delivered in the past.

A global trend to respond to the demands posed by the knowledge society has been to enact school reforms by reducing teachers' opportunities to take control over their work (Ravitch, 2011; Biesta, 2009). These trends see teacher agency mostly as a weakness within the operation of schools and seek to replace it with evidence-based and data-driven approaches as a means to ensure efficient and equal provision of education in terms of quality across the schools (Sahlberg, 2011). A common problem with the implementation of such educational reforms is, however, that it overlooks a broad range of concerns and issues that teachers need to manage in their everyday work while adapting to change, such as addressing diverse student needs (Kennedy, 2005; Rajala, 2016).

In Finland, the global reform movements in education have not affected the core values of trust-based governance where teachers are given autonomy to design their teaching and assessment based on their professional knowledge and decision-making (Sahlberg, 2011; Simola, 2015). In fact, in Finland, the implementation of educational reforms asks for teacher agency in making personal sense of the reforms and putting them into action at the local level. For instance, as the result of the Finnish new core curriculum, teachers are now invited to make local decisions of the educational use of digital technologies and tools as part of their instruction. The same applies to making sense of and applying new learning materials and learning environments that are being introduced to schools as part of the new curriculum. Overall, these changes call for teacher agency in making personal sense of new social and material arrangements and resources for teaching and learning, and revisiting their professional competencies and identities.

Informed by sociocultural theorizing (Lipponen & Kumpulainen, 2011; Emirbayer & Mische, 1998) our chapter focuses on understanding teachers' agency in making sense of and implementing educational reforms. By teacher agency we refer to teachers' agentic orientations that are displayed in their accounts of their practice. In particular, agentic orientations are indicated in teachers' critical evaluations and attempts to reconstruct their conditions of work. We do not conceptualize agency as a personal

feature of the teachers but in terms of what they do, that is, as an interactional process (see also, Goller & Harteis, this volume; Biesta & Tedder, 2007). We hold that teacher agency matters in educational change efforts as it is teachers who enact reforms in the daily practices of their classrooms and school communities (Biesta et al., 2015).

Not only do we regard teacher agency as an important element in enacting educational change, but also as an integral part of teacher professionalism entailing teachers' negotiation of broader educational visions and meanings that give a long-term purpose to their work (Priestley, Biesta, & Robinson, 2013; Toom, Pyhältö, & Rust, 2015). Moreover, teacher agency is related to organizational commitment, work satisfaction and well-being, and professional identity negotiation (Vähäsantanen, 2015; Vähäsantanen, Paloniemi, Hökkä, & Eteläpelto, this volume; Harwood & Froelich, this volume). It is hence important to understand the dynamics of teacher agency and conditions that contribute to its emergence, particularly in times of educational change.

In this chapter, we will discuss our research on teacher agency in making sense of an educational change effort within the context of two Finnish schools. In specific, we examine the display of agentic orientations in the teachers' accounts while they reflect on the uptake of a new digital learning environment, called the FUSE Studio at their schools as part of the adaptation to the new core curriculum. We pose the following two questions for our inquiry:

- What kind of agentic orientations to educational change do teachers display while they reflect on the uptake of a new learning environment in their schools?
- How are different temporal dimensions of agency displayed in teachers' accounts?

In the following, we will briefly review some recent research on teacher agency and educational change. After that, we will present a socioculturally-informed conceptual framework for researching teacher's agentic orientations towards an educational reform within a temporal framework. Then, we describe our empirical study situated in two Finnish comprehensive schools that were in the process of educational change due to the requirements of the new curriculum and national efforts to digitalize education. In the findings section, we provide illustrative examples from our teacher interview data via which we demonstrate the dynamic processes through which the teachers manage change and continuity and the meaning of teacher agency in this process. Our analysis revealed four agentive orientations with distinct temporal dimensions of agency that the teachers displayed towards the educational change efforts their schools were undergoing. Namely, *practical-evaluative orientation*, *Reproductive orientation; Critical-projective orientation,* and *Creative-projective*

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orientation to educational change. These agentic orientations and their temporal features unpack the dynamic processes how teachers manage educational reforms to address their personal and local needs (see also Hubbard, Mehan & Stein, 2006). We conclude the chapter by discussing future directions for research on teacher agency in the midst of educational change.

2 Teacher agency and educational change

Teacher agency has been proposed as an important mediator of educational change (Engeström, 2011; Priestley et al., 2012; Vähäsantanen et al., this volume). Research on teacher agency has problematized some core notions of educational change literature, such as the desirability of high fidelity in the implementation of change programs. For example, Buxton and colleagues (2015) listed a number of problematic assumptions in approaches that rely on fidelity of implementation, such as the existence of a clear a priori agreement about appropriate ways of implementing intended practices and the feasibility of a predictable path from teachers' participation in professional development workshops to intended changes in classroom practices. Instead, they used the notion of multiplicities of enactment to reframe fidelity of implementation to place emphasis on teachers' agentic translation of professional learning into professional practice. Similarly, Priestley and colleagues (2012) concluded that narrow notions of fidelity to policy intentions disregard a wide variety of ecological possibility and constraints that impact translations between policy and practice.

The extent to which teachers are able to achieve agency in their work varies from context to context based upon certain environmental conditions of possibility and constraint (Priestley et al., 2012). Even in restricted settings characterized by accountability and control mechanisms, teachers can achieve some extent of agency (Robinson, 2012; Buxton et al., 2015). Priestley and colleagues (2012) showed how teachers created a space for their agentic response to the constraints of traditional arrangement that put an emphasis on student attainment. The teachers' agentic orientation could be characterized in terms of the tension between educational ideals and actual constraints of the work. Robinson (2012) showed how collegial relationships enabled teachers to achieve agency to adapt and adopt policy requirements to fit some practices and reshape others.

Teacher agency is also known to take varied forms, and it is not only characterized by behaviors and outcomes that are intended or deemed desirable by researchers or policymakers. In Vähäsantanen's research (2015), vocational teachers' professional agency was manifested through stances and activities that varied from reserved and resistant to progressive and actively engaged in the reform. Also, Sannino (2010) showed that a teacher's resistance to intervention indicated her experiencing and

working with conflicting demands in teaching. The teacher's expression of resistance was a first step towards achieving agency to overcome the critical conflict that the teacher experienced in her work and to commit herself to master her working conditions.

In accordance to this earlier work, in our research we also recognise the multiple dimensions of teacher agency and how these can advance and also hinder educational change efforts. In specific, we focus on how teachers' agentic orientations towards an educational reform are composed of routine, projective and judgmental dimensions where past, present and future interact (Emirbayer & Mische, 1998). Thus, our approach underscores a temporal perspective to researching teacher agency and agentic orientations in the context of an educational reform. We argue that a temporal approach is vital for developing a more nuanced understanding of the meaning-making processes teachers go through during their possibly agentive adaptation to education reforms (see also Evans, this volume). The knowledge generated will contribute to present-day knowledge of the resources and support mechanisms that mediate teachers' work and agency in times of educational change.

3 A conceptual framework for researching teacher agency

The conceptual framework of our research work builds on the sociocultural theorising in which teacher agency is conceptualized as an ongoing process that is contextually and historically situated (Lipponen & Kumpulainen, 2011; Emirbayer & Mische, 1998; Engeström, 2011). Rather than regarding agency as residing in individuals, in this framework agency is viewed as an interactional process that results from the interplay of individual efforts, available resources and contextual and structural elements (Biesta & Tedder, 2007). In other words, agency is seen as an interactional achievement that is constructed relationally in dialogue with immediate as well as temporally distant interlocutors and contexts (Leander & Osborne, 2008). In this conceptualization, agency and structure are not opposed but presuppose each other in a dialectical relationship; structures shape people's agency, and conversely, people's agency reproduces or transforms structures (Sewell, 1992; Giddens, 1984; Emirbayer & Mische, 1998).

In particular, following Emirbayer & Mische (1998) seminal work, we argue that for understanding agency it is crucial to account for the changing temporal orientations of situated actors. Accordingly, we conceptualize agency as

> the temporally constructed engagement by actors of different structural environments—the temporal-relational contexts of action—which, through the interplay of habit, imagination, and judgment, both reproduces and

transforms those structures in interactive response to the problems posed by changing historical situations. (Emirbayer & Mische, 1998, p. 970)

As social actors respond to emergent events, they must continually reconstruct past from the perspective of the present. They also formulate projects in view of the future and realize them in the present, with unpredictable outcomes.

This conceptualization situates agency in a temporal framework and disaggregates it into its constitutive elements: iteration, projectivity, and practical evaluation. These three elements refer to different temporal dimensions of agency toward the past, the future and the present, respectively. The three temporal dimensions of agency are briefly summarized below (for more details, see Emirbayer & Mische, 1998).

The iterative dimension accounts for an agentive orientation towards the past. It refers to "*the selective reactivation by actors of past patterns of thought and action, as routinely incorporated in practical activity, thereby giving stability and order to social universes and helping to sustain identities, interactions, and institutions over time*" (Emirbayer & Mische, 1998, p. 971). The iterative dimension of agency posits agency in even the most routinized, pre-structured forms of social action (Biesta & Tedder, 2007). Thus, teachers who defend traditional ways of working and resist reforms are seen to be agentic in upholding the stability of social practice.

The projective dimension accounts for an agentive orientation to the future. It refers to "*the imaginative generation by actors of possible future trajectories of action, in which received structures of thought and action may be creatively reconfigured in relation to actors' hopes, fears, and desires for the future* (Emirbayer & Mische, 1998, p. 971)." For teachers the projective dimension of agency is evident in the short- and long term educational purposes and aspirations that give meaning and direction to their everyday work (Biesta et al., 2015). The projective dimension also addresses the imagination of alternative pedagogical arrangements.

The practical-evaluative dimension accounts for an agentive orientation toward the present. It entails making "*practical and normative judgments among alternative possible trajectories of action, in response to the emerging demands, dilemmas, and ambiguities of presently evolving situations.* (Emirbayer & Mische, 1998, p. 971)." The practical-evaluative of agency is evident in teachers' problem solving and deliberation in tackling with emergent events and obstacles in their everyday practice. In all, the temporal framework of agency helps us to pay attention to how individual teachers assemble their agentic orientation to their work by relating to their iterational (past), practical-evaluative (present) and projective (future) contexts.

There is only little empirical research on teachers' agency in a temporal framework. The most relevant research for our work is from the *Teacher Agency and Curriculum Change* project conducted primary and secondary schools in the UK in 2011 and 2012 (Priestley, Biesta, & Robinson, 2013; Biesta et al., 2015; Priestley et al., 2012). This research project focused on experienced teachers achievement of agency in their everyday work during the introduction of Scotland's Curriculum for Excellence in which teachers were explicitly positioned as agents of change.

The findings from the UK project illuminate the dynamics of teachers' agency in terms of an interplay of past, present, and future dimensions of agency. Priestley and colleagues (2012) showed the relevance of the iterative dimension, accounting for the formation of teachers' variously traditional or progressive educational aspirations. Their findings also show tensions between the projective and practical evaluative dimensions of agency, which were evident in difficulties in translating educational aspirations and ideals into practice within working conditions framed by pre-defined assessment and school quality assurance frameworks. Biesta et al. (2015) found that the teachers were prevalently oriented towards the here-and-now implementation of current and recent policies and appeared to lack projective agentive orientations stemming from reflections about the wider purpose and meaning of schooling. Similarly as in Priestley et al. (2012) study, the authors attributed the teachers' relatively weak future orientation to the systems of accountability that were in place in the school systems. These systems provided only little room for the teachers' agency.

The research made in the Teacher Agency and Curriculum Change project creates an interesting point of comparison to our study discussed in this chapter. In our study, we will similarly investigate teachers' agentic orientations towards an educational reform within a temporal framework. However, in contrast to the UK education system, the Finnish system represents a cultural setting with a preference to teacher autonomy and trust in teachers' professionalism (Sahlberg, 2011). This is supported by educational policy that grants autonomy and accountability to municipalities and its schools for developing their own strategies and ways to implement educational reforms.

4 Study description

The empirical data of our research stems from two Finnish comprehensive schools run by the city of Helsinki. The City of Helsinki is currently in the process of equipping all its schools with advanced digital technologies due to the requirements of the new curriculum and national efforts to digitalize education. School 1 is a primary school with 251 students (grade levels one through six, aged between 6-12 years) and 16 teachers. The school is situated in a suburb of Helsinki. School 2 is a comprehensive school providing both primary and secondary level education. It hosts 535 students and

28 teachers at the primary level. The school is situated close to the city center of Helsinki.

Both school communities have recently (in autumn 2016) introduced a new learning environment called the FUSE Studio (www.fusestudio.net) as a response to the digitalisation efforts of the City and the new Finnish core curriculum requirements. The FUSE Studio is a digital platform offering students with various STEAM (Science, Technology, Engineering, Arts, Mathematics) challenges that level up in difficulty. The challenges have been carefully structured to introduce students to new ideas and support them through more complex iterations of those ideas. Students can choose what challenges they want to work on, when, and with whom based on their own interests. They can choose to work alone or with peers. There is no formal grading or assessment by adults. Instead, using photos, video, or other digital artifacts, the participants can document completion of a challenge to unlock the next challenge in a sequence.

The primary data of our research discussed in this chapter comprise 23 teachers' accounts derived from semi-structured interviews conducted after a two-day in-service program on the FUSE Studio concept (in Spring 2016). The interviews were held at the teachers' own schools on one to one basis. The interview questions addressed the themes of the teachers' impressions and feelings about the FUSE Studio; FUSE students; FUSE and pedagogy; school culture and leadership; the curriculum reform. The teacher interviews lasted for about 30-45 minutes each. Each interview was audio-recorded and transcribed. The interview data were analysed using qualitative content analysis (Kvale & Brinkmann, 2009). Informed consent was obtained from the research participants. Moreover, to protect their anonymity, all names are pseudonyms.

In the analysis, we identified passages in which the teachers displayed agentive orientations towards the FUSE Studio. Agentive orientations were indicated by critical evaluations or attempts to reconstruct one's conditions of work. We also took note of the temporal dimensions of agency (iterative, practical-evaluative, projective). The iterative dimension was indicated in the teachers' accounts of preference of routine and habitual ways of working and the significance of past experiences for current ways of working. The projective dimension was indicated in the teachers' accounts with reference to educational ideals or future events. The practical-evaluative dimension focused on considering the pressing here-and-now realities of the school and local context in the implementation of an educational reform. Finally, we synthesized our analysis in terms of four specific agentic orientations to the educational change in which the different temporal dimensions of agency were invoked and interacted in specific ways. In the next section, we will illustrate the analytic categories in more detail.

For the purposes of this chapter, we draw on the data of four teachers, as these provide rich illustrative cases of their display of agentic orientations to educational change within the context of the implementation of the FUSE Studio. The examples have been selected for their illuminatory capacity rather than being taken to be representative of all the teachers.

5 Findings

Altogether, our analyses revealed the display four different agentic orientations in the teachers' accounts whilst making sense of the educational change taking place in their schools. We have named these agentic orientations as follows; (a) *Practical-evaluative orientation,* (b) *Reproductive orientation;* (c) *Critical-projective orientation,* and (d) *Creative-projective orientation* to educational change. In each of the orientations the different temporal dimensions of agency (iterative, practical-evaluative, projective) were invoked and interacted in distinct ways.

Next, we will discuss these findings more closely. We will consider what these agentic orientations revealed about the ways in which the teachers managed educational change and how they accommodated institutional and personal needs in this process.

5.1 Practical-evaluative orientation to educational change

We illuminate the display of practical-evaluative orientation to educational change by using Kalle as an example. Kalle is a class teacher who displayed a generally positive orientation towards the new digital learning environment, the FUSE Studio but was concerned about its feasibility given what he perceived as students' lack of basic skills in using digital devices and in taking responsibility for their learning. The practical-evaluative dimension of agency was dominant in the interview account due to Kalle's emphasis on the work needed to adapt the FUSE Studio to the practical reality of the school and the demands posed by the students' lack of skills and motivation.

Kalle described himself as a pioneer in adopting a digital learning approach in his teaching:

Excerpt 1

> Kalle: Because I have a background, I have those mini-laptops, they are now five years old, I've been using them for so long and then I was [unclear], I made many things in the Fronter environment, I feel that I was already

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there, well I am not saying that I was in the top league but nearly there, doing things, we made a lot of collective things in Fronter and then we had the laptops and we made role-playing games and other things.

Upon changing to the current school he was shocked to realize that his teaching approach that worked well in the previous school seemed not to be adequate for the students he was currently teaching, as illustrated in the following excerpt.

Excerpt 2

> Kalle: I had twenty children from the neighborhood that lived in privately owned houses with both parents and it [Kalle's teaching] worked well like "the toilet in the train", and then when I started in this school and became a teacher of the fifth grade, and I had just worked with the fifth and sixth graders and I thought that I will just continue the same, and then it didn't work out that well, it was not the same, so that yes we can do it, and that I'll do more, the differences were so massive, so that the good ones [students] were really good, but the weaker ones [students] were really weak….here then we have the equipment, and if the laptop is left at home, and then it is difficult, so what can we do since we don't have that and other things, what I mean in conclusion is that for this school since there are many diverse kids and then we start to use a teaching style that is based on conducting project work and then at the same time concentrate on the discipline matters so that you do not know how it works out overall. Sure, if we manage to create a good feeling, and then you have this and other things, it could well work out, but with us it doesn't work that way, I don't know what it takes.

In the excerpt, Kalle suggests that different socio-economic and cultural backgrounds of the students in the current school as compared to the previous one imposed a significant barrier for him to continue to use the pedagogical approach related to digital tools. In the current school there were a lot of problems in his use of this approach, related to students' negligence and disciplinary issues. Here, we can see an interesting interplay between iterative and practical-evaluative temporal dimensions of agency; the present conditions of the school where Kalle is working force him to question and adjust his habitual teaching approach that originates in his work in the previous school. Thus agentic work is needed for him to contextualize his past modes of working to the present conditions.

Kalle also stressed that in the implementation of the FUSE Studio teachers should take into account the reality that - contrary to the common discourse of children as capable diginatives - many students lacked even basic skills in using digital devices.

Excerpt 3

> Interviewer: Do you think FUSE fits with all students, or for some better than others?
>
> Kalle: We talk about diginatives and so on, and it should be like that and it is not, that there is from that on, that I have said it so many times, so that if I have twenty-two kids there are at least five of those when we go somewhere, and there is a website we should go, that is the line for the address, it is not a google search window or alike and that is the address line, that it is there where you insert the address and it goes to that address what has been written there, and if it is correct, and if you write in the Google it is little bit different thing than the address line, this is the address line and from that on, so that it is these kind of things we begin and then with them... I noticed that this is not going to work, you cannot even open the program in practice, that it is pretty limited what they can use, that it has been better in the past I would say compared to the present situation, so that it is my gut feeling, that it's really great but not many will do such things that you really, that I am scared since a way there is the core curriculum and everyone is going to that direction that you search for information and that you can evaluate its reliability and else, well okay it needs to be taught, but it is at such a weak level.

In the excerpt Kalle reported that while the hands-on tasks of the FUSE Studio might be motivating for some students, it nevertheless required basic skills in the use of digital tools and in taking of responsibility of one's own learning that he perceived many of his students to be lacking. By relating a concrete example of similar ways of working, Kalle critiqued the curriculum reform as a whole of being based on false understanding of the students. In other words, he considered that the practical realities of schools were not adequately taken into account in the curricular visions. Elsewhere in the interview, Kalle reported that he was concerned that whether the FUSE Studio tools including the small parts would stay in good order to be usable, given the negligence of the students in the school.

In his critical reference to the curriculum reform and its visions that relied on the notion of active students, the projective dimension of agency was salient in Kalle's orientation. However, the dominant temporal dimension of agency Kalle displayed in his orientation to the FUSE Studio was the practical-evaluative dimension. This dimension was evident in the strong emphasis on the work needed to contextualize the past habits and future visions to the present-day practical realities and dilemmas.

5.2 Reproductive orientation to educational change

Next, we will illuminate the display of reproductive orientation to educational change through Anne's interview. Anne is a physics and chemistry teacher teaching in the lower secondary grades. Anne's agentic orientation to the FUSE Studio can be characterized in terms of a reserved stance. She saw that the pedagogy associated with the FUSE Studio limited her possibilities to foster students' conceptual engagement and learning in chemistry and physics. For one, she was disappointed that the FUSE Studio did not involve any challenges in chemistry. Moreover, the pedagogical principles of the FUSE Studio that centered on students' choice and interest-driven learning appeared for her to result in a loss of control that was necessary to guarantee adequate conceptual learning. The reproductive orientation that she assembled as a response to her interpretation of the FUSE Studio revolves around the iterative dimension of agency. This orientation was evident in her plan of reproductive adaptation of the FUSE Studio that would enable her to reproduce her habitual way of working by limiting the degrees of freedom for the students.

In the following excerpt, Anne describes how she planned to make use of the few FUSE Studio tasks that resonated with the goals of the physics curriculum.

Excerpt 4

Anne: I want to try the physics side with secondary school students.

Interviewer: What is there in the physics side that probably inspires students?

Anne: Namely that that that energy-thing. There was that, that roller coaster (I: Yeah, there was) It fits nicely with the topics of the eight grade.

I: Yeah, why, why do you think this type of task is good or….

Anne: No but they are authentic, so that it is not just a calculation task or a theoretical thing in the classroom, but they could really try it out, how it is built and what kind of results you can get from it.

I: So is this typical let's say in your teaching that you build something like this, or is it more like this as you said a theoretical thing in the classroom?

Anne: We surely do these types of experiments if possible ….tasks. What one can do, since the time is always limited unfortunately, so that we cannot do everything, but we'll try as much as possible.

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The excerpt shows that Anne saw the FUSE Studio as potentially enriching her physics instruction by providing ready-made tasks that involved hands-on experimenting with materials. Her responses indicate that designing such tasks was not always possible in the given time constraints.

In the following excerpt Anne elaborates on her plan for using the FUSE Studio.

Excerpt 5

> Anne: To my mind, I mean us, the folks in our school disagree whether all tasks are open always or whether we should limit the tasks according to age-level and so forth. I don't know.
>
> I: What's your opinion to this?
>
> Anne: I think, it should be like this that there are certain packages for certain age-level.
>
> I: Okay.
>
> Anne: Otherwise it can easily happen that when you have them all and everyone wants to print with a 3D-printer, they will work on the same thing, that they can just print a keyring or what was it.
>
> I: Okay. What's problematic with it? I'm not challenging you, I'm just asking since I want to learn from your thinking. Although it may feel self-evident, can you nevertheless let me know what is problematic in that the students' would continue doing the same thing?
>
> Anne: Since not all are interested in the same things. Some do tasks that are as easy as possible. And maybe it's such a fun thing, that you get a kind of material artefact after the project. I, I don't know, I...
>
> …
>
> Anne:...it is up to the teacher in the sense that I will choose it, that one theme what we will go out there to experiment and research. But, there, that, that, I will not teach by the hand but there they can really investigate it and then we jointly reflect on it and add theory-background there as well.

In the excerpt, Anne explains that her approach to the FUSE Studio involves disregarding its major design principle, namely the students' choice over which

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challenge to work on. Instead, she plans to effectively reduce the FUSE Studio into a set of well-designed hands-on tasks by limiting the choice to a single task that she has carefully chosen beforehand.

Anne's display of the reproductive orientation to FUSE Studio illustrates the dominance of the iterative aspect of agency. She is effectively reproducing her past way of working that she considers effective in supporting students' conceptual learning in physics. Here she is balancing the tension between supporting students' agency and maintaining control over classroom events (see also Rainio & Hilppö, 2016; Rajala et al., 2016).

5.3 Critical-Projective orientation to educational change

We will illuminate the display of critical-projective orientation to educational change by using Saara as an example. Saara is a special education teacher in the lower grades. Her job is to provide part-time special needs education for children who are assigned to regular classroom but have special educational needs. Saara's overall orientation towards the FUSE Studio was strongly positive. She saw in it a potential to realize the goals of the curriculum reform. She was supportive of the reform because it was in line with her personal educational vision that stressed the recognition of individual potential of every child. Saara displayed a critical-projective orientation towards the FUSE Studio. This orientation was realized primarily in terms of the projective dimension of agency, which was evident in her strongly held personal educational ideals. However, the practical-evaluative dimension of agency was evident when she stressed the need of concrete tools to help realizing the abstract goals of the curriculum reform. Moreover, the iterative dimension was evident in her critical stance towards the everyday practices of the school that reduced her possibilities for realizing the kind of pedagogy that resonated with her educational ideals.

In the next excerpt Saara explains her educational ideals and the need for concrete tools for realizing them.

Excerpt 6

> Interviewer: And then what about this FUSE and teaching, do you see, maybe you do, that this FUSE can fit with your teaching?

> Saara: Yep, for my teaching this would fit for sure. I think that there is something here. Perhaps the word tool repeats itself, but maybe it is just it that describes it the best, so that the implementation of the core curriculum and interest-driven work do not realise themselves only at the level of

ideology. Yeah, I have a feeling that these could be realised via FUSE, it would easen them.

I: So that you need tools, you think in that way?

Saara: Yes, I think for the new curriculum, yes, I think so, that we need to have some sort of tools. If we have to have tools for evaluation and for planning, something. And to realise digitalisation I think we need tools. You cannot just think that you do it. Instead, we need something longer than the hand here. At least to get started. I think in a way that all sorts of things require a specific tool so that I can develop tools for myself as a way of overcoming the first step. That someone has [laughs] already thought through that new things a kind of basic work takes so much time, so that when someone says that try this for example it will help drastically compared to a situation if I were to develop something new besides my work.

The excerpt shows that Saara considered the goals of the curriculum reform as too abstract. She stressed the need for concrete tools that could help to realize these goals. Her account suggests that even for committed teachers much work is needed to realize these visions and ideals in the here and now of everyday life in schools. Thus, the strong projective dimension of agency in Saara's orientation to the FUSE Studio – evident in her emphasis on the educational ideals – is balanced by the practical-evaluative dimension of agency. The latter is evident in the realization that the abstract ideas need to be translated into down-to-earth effective tools for planning, assessment and digitalization.

The next excerpt shows that the educational vision helped Saara to call into question the daily instructional practices in the school.

Excerpt 7

I: What is your teaching like at the moment, how would it concretely change as the result of the FUSE?

Saara: ...my work is at the moment more about it that those who do not follow in regular classes. So I try to support them. And my thinking is that via FUSE I could be at the lesson more to inspire and support when I am there on the spot where the actual work is done [laughs]. I would not have a sort of replacing work but it would be supportive work from the beginning so that no-one would drop and that I would no longer had that job of trying to support the dropouts. On the contrary, I would be there where everything

happens and give support there already. I do not quite know yet how this would take place but that is my dream [laughs].

I: Do you have that kind of experience that in the school your students are required to accommodate to a one style that there is not room for variation?

Saara: Yeah, unfortunately a lot. That time at a time when you go through the page in maths lesson and you did not pass it on time. And you again not, you have to work at home a lot and the meaning will be lost in three minutes. If the teaching is very much traditional and based upon books then not many will be able to follow, but...and I think that really in my work there is a very small portion that there are learning difficulties. There are more problems in self-esteem and the ways in which to find one's own learning style. If the requirement is to work in one way, there is only one possible way to learn. That is, my work is now that I try to find a second, third or fourth way to learn. And I try to make teachers understand that you can also work in this way [laughs]

The excerpt shows that Saara saw a transformative potential in the introduction of the FUSE Studio to question and alter the organization of education for children with special needs. She problematized the division of labor between the class teachers and herself in the role of special education teacher. Instead of helping students who were lagging behind of the regular instruction catch up, she preferred preventive support that would help the students before they got into trouble in the first place. In fact, she attributed part of the failure of the students to the nature of the instructional practices and the educational tools that were used. She criticized that a specific and homogeneous learning approach was regularly demanded from the students. There was not room for diversity of learning approaches in classrooms. In the FUSE Studio she saw potential for such diversity.

Thus, the excerpt illuminates an interplay of the projective and iterative dimensions in Saara's orientation to the FUSE Studio that culminated into a critique of the current ways of organizing the education of the part-time special education students. This critique was made meaningful in light of the educational ideals that Saara displayed.

5.4 Creative-projective orientation to educational change

We illuminate the display of creative-projective orientation through Mikko's interview. Mikko had just been recruited as a craft and technology teacher in the upper grades in one of the participating schools. Mikko was also appointed as the teacher responsible for the maintenance of the FUSE Studio equipment. Moreover, Mikko had relevant background experience of teaching in an informal technology education

setting and acted as a board member in the association that arranged this education. The creative-projective orientation involved an interplay of iterative and projective dimensions of agency that were evident in Mikko's attempts to envision a novel pedagogical concept through a creative synthesis of old and new tools and ways of working.

Although generally displaying a positive orientation to the FUSE Studio, Mikko had reservations about its tasks and materials, as shown in the following excerpt.

Excerpt 8

> Mikko: … is it necessary that there is directly like only one way to solve it [a FUSE Studio task] which can be completed with these specific tools that we have given? I can understand that view or that setting because if there are no facilities or there are no crafts lessons in some schools in the States, now with the FUSE all this information has to come in, all knowledge and materials and solutions and these, so that more than, so that if it's brought to Finland then you should see the potential to apply and change the basic set since there is the crafts education culture which is pretty strong in Finland… I can understand that not all things can be given in a box but you must find the solutions yourself and the ways in which to work and that it gives you much more, it's never ready in a way. The work is never ready. Since there are no edges of the box, they will never become visible because there was no box.

In the excerpt, Mikko criticized the FUSE Studio challenge tasks for requiring a single specific solution instead of offering multiple routes to a successful task completion. He also regarded as a limitation that the tasks were associated with ready-made materials that were provided in boxes associated with each task. In Mikko's interpretation these shortcomings stemmed from the lack of tradition of craft and technology education in the US. As a comparison, he referred to the culture of craft and technology education in Finland in which, in his description, open-ended tasks are preferred and students need to select appropriate tools and materials themselves. In Mikko's opinion, the latter approach resonates more with the problems and challenges that the students would encounter in their lives outside of school.

Mikko's ideas about the FUSE Studio were not limited to those intended by its designers. Instead, he wanted to go beyond the limits of the FUSE Studio and envisioned a learning environment that he called a makerspace that he wanted to build in the school. This makerspace would incorporate some features of the FUSE Studio but go beyond its limitations and incorporate its concept within a more general framework of a makerspace.

Excerpt 9

> Mikko: In the school we have a good situation that we have a comprehensive school with crafts classes… So pretty naturally the FUSE is from my perspective the virtual department. This means that there could be an appropriate technology class or properly equipped mobile carriage system or so, I do not think that it requires a special space for the technology making, since crafts spaces are relatively good for this purpose.... A space for dusty, dirty work. Then we have a clean and wet and then fun space where it is like this and then you can mess around. So that it is inspiring, structured and somewhat functional space. And then the FUSE is part of it.

> Mikko: Yeah, that it has been a long-term career dream or goal that I could build makerspaces. I would gladly continue working in such a space. But that it what I kind of, I don't know, maybe my education aims for co-ordinating or establishing such a space, so that then there comes this openness and mentality of sharing.

In the excerpt, Mikko envisions a makerspace learning environment in which traditional materials and ways of working would exist side by side with the FUSE Studio digital tools. He first describes the opportunities for interdisciplinary work and engagement with materials and tools provided by the material spaces and furnishing of the special purpose classrooms. He then elaborates on what is the role of the FUSE Studio in the envisioned makerspace. Ultimately, the makerspace for Mikko is not only about the specific tools or even interdisciplinary work. Instead he refers to it as a specific culture that was characterized in terms of openness, communal sharing and students' involvement.

Mikko also noted some tensions between his vision and the concept of the FUSE Studio as a closed environment that was beyond the local control.

> Interviewer: Do you see that this FUSE supports your vision or is it even against it?

> Mikko: It is a closed environment. That is true. I do not know how to get its licence. Do we have to pay something or do we have to apply for it? But there are those usernames, school-based usernames, that tells that it is not open but perhaps they have their own reasons for it.

Overall, in Mikko's display of agentic orientation to the FUSE Studio both iterative and projective dimensions are strong. The iterative dimension of agency is evident in

his pride of and reliance on the Finnish tradition of craft and technology education, as well as in his attempt to bridge traditional and new tools and ways of working. The projective dimension of agency is strong in his desire to create a new kind of working space characterized by a distinctive culture of making and communal sharing. In this respect, the FUSE Studio was a steppingstone to his envisioned new space.

6 Discussion

In this chapter, we have discussed a study on teacher agency in the midst of an educational change effort within the context of a Finnish school system. In specific, we investigated the agentic orientations of teachers while they managed educational change efforts in their schools involving the introduction of a new digital learning environment, the FUSE Studio, in their schools as part of the adaptation to the new core curriculum.

Via illustrative examples stemming from our teacher interview data we identified four agentive orientations that the teachers displayed towards the educational change efforts associated with the introduction of the FUSE Studio. Firstly, the *practical-evaluative orientation* emphasized the contextualization of the educational change in the practical realities and actual details of the teachers' work. For example, through the practical-evaluative orientation one of the teachers, Kalle, critically scrutinized his own pedagogical aspirations stemming from his past experiences as well as - in his opinion - overly optimistic beliefs involved in the discourse around the new curriculum. Secondly, through the *reproductive orientation* the change effort was appropriated within a habitual pedagogical framework that placed value on existing practices by considering how they could be implemented in the new learning arrangement. For example, through the reproductive orientation one of the teachers, Anne, formulated a plan for using the FUSE Studio as part of her physics instruction based on her choice regarding the actual tasks instead of giving the students a chance to choose. While this orientation compromised the key pedagogical principles of the FUSE Studio, Anne nevertheless saw the reform as enriching her current ways of teaching through a provision of well-designed hands-on tasks that she seldom had time to design herself.

Thirdly, the *critical-projective* and *creative-projective orientations* manifested the teachers' future-orientation and transformative agency. For instance, one of the teachers, Raija, identified a transformative potential in the FUSE Studio to better address diverse students' learning needs. The critical-projective orientation helped her to articulate criticism of the current pedagogical practices in the school. Another teacher Mikko, on the other hand, criticised the FUSE Studio for its somewhat closed tasks. Nevertheless, the FUSE Studio appeared to further his long time pedagogical aspiration regarding the creation of a novel learning space for his students in the

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future. In sum, all these findings evidence that it is not so much the new learning environments or materials as such that matter for educational change but how teachers make sense and add to them, through their agentic orientations.

The different agentic orientations that the teachers displayed singled out different educational features in the FUSE Studio. The special education teacher Saara emphasized students' choice-based learning and opportunities for the realization of students' individual potential. The physics teacher Anne noticed the opportunities for conceptual learning in physics. The craft and technology teacher Mikko approached the FUSE Studio from the tradition of Finnish crafts education identifying both weaknesses and possibilities in the new learning environment. The teacher Kalle linked the FUSE Studio to the new curriculum, considering its implementation within the constraints of the everyday realities of the school. These agentic orientations also manifest the teachers' transformative agency (Engeström, 2006) in the process of considering and adapting to educational change. That is, not only did the teachers conform or resist the FUSE Studio but they also considered it as a stepping stone to further develop their teaching and creating students with better opportunities to learn. All this also asked for the teachers' conceptual agency (Greeno, 2006; Lipponen & Kumpulainen, 2011) to make sense and further develop their teaching.

Our data and analytical approach did not permit us to investigate how the teachers enacted their agentic orientation towards the FUSE Studio in practice. Neither are we able to demonstrate how the teachers' agentic orientations developed over time towards the FUSE Studio as the result of their daily work in the learning environment. However, the enactment and over-time development of teacher agency and agentic orientations as reflected in everyday practice are topics worthy of research attention in the future.

Altogether, our findings suggest that there are several, and at times, conflicting agentic orientations that mediate teachers' management of educational change efforts in their schools. Yet, a successful educational change in a school community requires teachers to reconcile and negotiate a joint understanding between different and possibly contradicting agentic orientations. For sustained educational change to take place, there is a need for collective sensemaking. Important points to be discussed are the purposes of the reform, critical evaluation of existing practices, and how the reform can be contextualized in the details of the everyday practices of the school. These insights are probably useful to practitioners and policy makers in Finland and in other countries that are undergoing educational change. In countries where the education system is similar to the Finnish system there is more scope for the teachers to display diverse agentic orientations, and the educational reforms usually leave the outcomes of the educational change open-ended (e.g., Vähäsantanen et al., this volume; Pyhältö, Pietarinen, & Soini, 2014). For international audiences who work in

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countries with accountability systems that constrain teacher agency, our findings nevertheless point out the importance of taking into account teachers' own sensemaking when implementing reforms (see also Priestley et al., 2012). It seems important that during educational reforms teachers are seen as valued participants who can collectively develop a shared vision and purpose to change efforts.

In addition, our findings are relevant for those who design interventionist research that seeks to foster educational change by promoting teacher agency (Pyhältö et al., 2014; Vähäsantanen et al., this volume). For instance, our findings suggest that it would be important to facilitate collective sensemaking among teachers in school communities through deliberative reflections on their agentic orientations in terms of an interplay of past, present, and future dimensions of agency. Although in some interventions that aim at promoting teacher agency temporal relations are addressed - such as in the study by Pyhältö and her colleagues (2014) who asked teachers to produce an essay on 'Remembering the future' - overall there seems to be few studies in which the temporal dimensions of agency would have explicitly addressed to foster educational change through intervention designs.

To conclude, the temporal framework of agency (Emirbayer & Mische, 1998) that guided our investigation helped us to disaggregate agency to its constituent elements. Instead of vague claims that teacher agency need to be increased, our framework made explicit how teacher agency was manifested in a variety of productive and sometimes unproductive ways. Furthermore, our analysis of the temporal dimensions of agency highlighted the fundamentally context-bound nature of teacher agency (see also Evans, in this volume). That is, our study confirms that agency does not exist in the abstract - as a feature isolated from its social, cultural and historical contexts - that can be increased through teacher professional training. Instead the form and content of agency is always stemming from the specific nested temporal-relational contexts in which actual situated actors are embedded and with which they interact. In this sense, the individual teachers' agency is also intertwined with the collective practices of the schools. The social practices of the school and the school-level organization of teaching and learning - which are to much extent beyond the influence of individual teachers - constrain and enable specific forms of agency.

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