



Research paper

Teacher self-efficacy as an aspect of narrative self-schemata

Gosia Marschall ^{a, b, *}, Steven Watson ^b^a Department of Mathematics and Science Education, Stockholm University, Sweden^b Faculty of Education, University of Cambridge, United Kingdom

HIGHLIGHTS

- Narrative imagination is central to how we make sense of affective experiences and cope with complex demands of our lives.
- Teacher self-efficacy appraisal attends to wider conceptualisations of narrative self or narrative self-schema.
- Teacher self-efficacy is in much closer relationship with narrative identity formation than previously articulated.

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ABSTRACT

This study represents a theoretical investigation of teacher self-efficacy using abductive interpretative phenomenological analysis in the context of initial teacher education. We reveal the process through which a pre-service teacher's self-schema adapts in response to his first classroom teaching experience. We also observe that narrative has a role in this self-schema adaptation. Consequently, we show that teacher self-efficacy is an aspect of a more generalised narrative self-schema. This offers an alternative perspective on how teacher self-efficacy is developed. It contributes to a deeper understanding of pre-service teachers' professional learning and a new understanding of the concept of self-efficacy more generally.

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1. Introduction

A growing body of research on teacher self-efficacy appears to demonstrate its importance as a concept; principally because quantitative studies reveal its correlations with a range of positive educational outcomes and experiences (Klassen et al., 2011; Wyatt, 2014). For example, more efficacious teachers appear to be more effective in behaviour management (Chacón, 2005); they are more likely to experiment with and be more ambitious in their teaching (Abrami et al., 2004); they tend to implement student-centred or constructivist teaching strategies (Nie et al., 2013); they are more likely to use innovative approaches in the classroom (Thurlings et al., 2015); and, consequently, they appear to have a positive impact on student achievement and motivation (Bruce et al., 2010; Thoonen et al., 2011). Less efficacious teachers are more likely to develop high levels of work-related anxiety and are likely to be

affected by teacher burnout (Aloe et al., 2014; Collie et al., 2012; Klassen & Chiu, 2010).

Self-efficacy theory has been important in our own qualitative research as a way of conceptualising mathematics teachers' professional learning (Watson & Marschall, 2019). Beyond being a belief in personal capability, we see self-efficacy as a useful way of navigating the internal psychic worlds of cognition and the social aspects of professional learning (Marschall & Watson, 2019). As Bandura points out in regard to self-efficacy, "people are producers as well as products of social environments" in a process of "reciprocal causation" (Bandura, 1997, p. vii). Bandura presents self-efficacy in a constructivist framing, as a self-schema – a model of self which is dynamic and responsive to experience, memory, the social world and possibilities for the future.

While we recognise the value of teacher self-efficacy in human development and education, we are not alone in recognising a need

* Corresponding author. Department of Mathematics and Science Education, Stockholm University, Sweden.

E-mail address: mzm21@cam.ac.uk (G. Marschall).

to examine it conceptually and qualitatively (Labone, 2004; Philippou & Pantziara, 2015; Tschannen-Moran et al., 1998). In spite of an increase in the number of mixed-methods studies, and to a lesser degree qualitative studies in the field in the last two decades, teacher self-efficacy research has remained predominantly quantitative (Klassen et al., 2011; Wyatt, 2014). Yet, we agree with Wyatt (2014), Philippou and Pantziara (2015) and Glackin and Hohenstein (2018) who expound the need to examine the conceptualisation of self-efficacy qualitatively. Moreover, we argue, the issue of improving our understanding of how self-efficacy is developed prompts questions about, or at least an exploration of, the theoretical basis of self-efficacy. Knowing how self-efficacy is developed – beyond being a ‘measure’ of belief in personal capability – requires knowledge of the processes through which self-efficacy is cultivated, and that requires elaboration of theory, which goes beyond Bandura’s original and widely utilised four-source framework (Klassen et al., 2011). In our work, we adopt a novel approach to theory development which involves both abductive analysis (Tavory & Timmermans, 2014) and interpretative phenomenological analysis (IPA) (Smith et al., 2009), which we refer to as *abductive IPA*.

We begin this article with a description of our conceptual framework. We emphasise, however, that the conceptual framework should not be understood as either a starting point or necessarily an end point in our abductive research; it should be seen as a culmination of a dialogue between theory and data. We begin by stepping back from conceptualisations of self-efficacy as a personal belief in capability and consider a more general characterisation of self-efficacy as a self-schema. We follow this with a discussion of the narrative aspects of self-schema. The rest of the paper is organised in an orthodox way. First, we describe the study’s methodology and research design, which is based on an instrumental single case study of a pre-service secondary mathematics teacher. This is followed by our analysis which focuses on the teacher’s meaning making in relation to his experience and teacher self-efficacy development during his initial teacher education year – a meaning making process which we argue has narrative characteristics. Finally, the study concludes with a theoretical elaboration on the narrative appraisal process of teacher self-efficacy self-schema and discusses the implications of this theoretical turn.

2. Conceptual framework

2.1. Self-efficacy and teacher self-efficacy

Self-efficacy has been defined in terms of “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performance” (Bandura, 1986, p. 391). It is a domain-oriented, task and context specific judgement (Bandura, 1997, 2012). In the teaching domain the most influential and dominant construct of teacher self-efficacy is that of Tschannen-Moran and Woolfolk Hoy’s (2001). Derived from extant models, theoretical analysis and quantitative methods (Tschannen-Moran et al., 1998, 2001), it includes three task dimensions: *classroom management*, *student engagement* and *instructional strategies*. It is prevalent, as a three-factor measure, in quantitative studies, although it has also been used qualitatively, where it reveals an acceptable level of construct validity (see, for example, Watson & Marschall, 2019). In lieu of more sophisticated analyses of teaching tasks, the distinctions between the task of managing the class and individual student behaviour, the planning and teaching of engaging and motivating lessons and the tasks of deploying instructional strategies, including questioning and explaining, provide a plausible and viable construct of the tasks of teaching.

Bandura (1997) posits that self-efficacy is evaluated, developed and changed through the appraisal of information about individual capabilities in contextual activities and tasks. This information is acquired through modelled behaviour and observational learning, social persuasion and enactive experiences, and from information about somatic and affective states. These are referred to as the four sources of self-efficacy: *vicarious experiences*, *social and verbal persuasion*, *enactive mastery experiences* and *physiological and affective states*. Importantly, Bandura emphasises that, “self-efficacy is not the simple product or sum of one’s experiences” (Morris et al., 2017, p. 798) but is a result of the cognitive processing in relation to those experiences (Bandura, 1997). This processing includes assessment of the individual’s effort expended, and the perceived level of success in a past experience in relation to the task difficulty. This, in turn, leads the individual to construct and visualise situations to anticipate future performance outcomes and to guide future actions and experiences (Bandura, 2006).

2.2. Self-schemata

The idea that we construct schemata (schema, singular; schemata, plural) or mental models to guide action has been given increasing attention since Piaget and, previously, Kant, who referred to *transcendental schemata*. In psychology the term “schema” was originally posited by Bartlett in explaining how memory is organised (Bartlett, 1932). More recently, schemata have been characterised by self-referentiality. Self-referential schemata or self-schemata can be defined as, “... cognitive generalizations about the ‘self’ derived from experience that organize and guide the processing of the self-related information contained in an individual’s social experience” (Markus, 1977, p. 64). The role of self-schemata in human thought and action follows a constructivist tradition which includes thinkers such as Vygotsky, Bruner and von Glaserfeld.

Self-schemata are dynamic cognitive representations of self-related information or active knowledge structures about the self (Sherman et al., 1989; Trzebinski, 1995). As representations of the ‘self’ acting in the world, they act as a bridge between perception and action (Lord & Levy, 1994). Self-schemata “organize and guide the processing of the self-related information contained in an individual’s social experience” (Markus, 1977, p. 64). They function as selection mechanisms, which help facilitate the imagination of possible future selves (Trzebinski, 1995). Bandura too characterises self-efficacy in a way that is consistent with constructivist thought – as a kind of self-schema:

The development of self-knowledge is a cognitive construction rather than simply a mechanical audit of one’s performances. People do not approach tasks devoid of any notion about themselves or the world around them. Through transactional experiences, they evolve a structured self-system with a rich semantic network. These self-schemata of personal efficacy influence what people look for, how they interpret and organize the information generated in dealing with their environment, and what they retrieve from their memory in making their efficacy judgements (Bandura, 1997, p. 81).

This conceptualisation of self-efficacy is consistent with the idea of mediating the relationship between knowledge and action. There is a clear phenomenological shift here: rather than an individual mind calculating and rationalising the world based on sensory inputs and then guiding action and behaviour, people construct a model of themselves acting in the world. Although this remains an abstraction of the self, it is dynamic and engaged in constant interaction with a changing, complex and often

unpredictable world.

Consequently, our interest here goes beyond our initial consideration of self-efficacy development through Bandura's four sources (Watson & Marschall, 2019), to seeing self-efficacy as a self-schema and the processes through which that self-schema adapts in response to experience. Fundamental to this is the individual's interpretation of, or meaning making, in the context of their experience. Hence, in this research, using a single case study and abductive IPA, we investigate experience and interpretation – we examine the meaning making and interpretation that underpin the adaptation of self-schemata. As we show in the analysis, this adaptation process involves a narrative construction of self.

2.3. The narrative self

As generalised dynamic models of 'self' acting in the world, self-schemata are developed in the present, with reference to past experiences, and imagined possible future selves (Stangor, 2019). As Schechtman explains: "The past should not only be remembered; it should help to explain the present, which in turn should help to predict the future" (Schechtman, 2005, p. 20). This suggests that the process of sensemaking and meaning making involve narrative as a vehicle for organising experiences (Bruner, 1990). Biographical and narrative structures allow us to interpret "... [our] experiences and give meaning to our relationship with the world in a manner that reflects and enacts our experiences in the past, present and anticipated future" (Märtsin, 2019, p. 670).

Dillabough (2020) argues that educational perspectives generally marginalise the human propensity for narrative imagination and that educational theory largely ignores the profound contribution of thinkers such as Ricoeur, who see the narrative imagination as central to identity. According to Ricoeur (2008), narrative identity involves individuals making sense of their existence, actions and potentiality in a hermeneutic production of self among other selves in social contexts (Pellauer & Dauenhauer, 2020). This is similar to the idea of a narrative self-schema, which is a domain- and context-specific cognitive schema in which self-narratives frame how individuals understand themselves and reality through an on-going engagement with the world (Trzebinski, 1995). Through narrative, an individual "configures temporal elements into a whole by grasping them together and directing them toward a conclusion or ending" (Polkinghorne, 1991, p. 141). Like self-efficacy schemata, narrative self-schemata have a future orientation, which allows for the construction of possible future selves. This allows for a sense of continuity in the construction and narration of self, while allowing for a horizon of possibilities in response to experiences in the moment. Possible selves not only permit a continuity of the narrative self, as a seemingly 'seamless' autobiography, they legitimise more immediate action by guiding toward who one wishes to become. They also help to reduce complexity in the affective present (Robinson & Davis, 2001).

It is evident that this discussion alludes to the construction of a professional narrative identity, which through a narrative construction "makes us able to cope with new situations in terms of our past experience and gives us tools to plan for the future" (Sfard & Prusak, 2005, p. 11). While this research does not specifically address the development of professional identity, it is important to make reference to the key ideas. Teacher identity is characterised as "a set of self-understandings related to ways of being, living, and projecting into the teaching profession" (Losano et al., 2018, p. 291). Or as Sfard argues:

The discourse of identity is where the social, the individual, as well as the cognitive and the emotional are expected to meet and turn into inseparable, co-constitutive aspects of one

phenomenon. Identity is also the construct with the help of which one answers both the question of what is unique to a person and of what makes this person a member of a kind. As the epitome of one's special ways of being in the world, identity must be reflective of this person's thinking and feeling; as a construct that portrays people as representatives of existing socio-cultural categories, it is expected to be helpful in figuring out how the individual emerges from the social and the other way round, how individual ways of acting feed into those of collectives (Sfard, 2019, p. 556).

These notions of identity, which are consistent with conceptualisations of self-schema, consider professional identity in relation to experience and affect and to the construction of 'self' in a wider social world. Within the construction of an 'identity', we suggest, is the adaptation of a narrative self-schema.

3. Methodology

The strategy for this research involved a single case study and abductive IPA. The phenomenological approach centres on the research participant's experiences and the interpretation of those experiences. At the heart of IPA is sensemaking or "how particular experiential phenomena have been understood from the perspective of particular people, in a particular context" (Smith et al., 2009, p. 29). The second-level of interpretation, our interpretation of the participant's interpretations of their experiences, involved theoretical inferences. Our aim here was the exploration of the concept of teacher self-efficacy. It is this process of interpretation that reveals how the participant's teacher self-efficacy self-schema dynamically adapts to experience and context (Markus, 1977).

Abductive analysis involved revisiting theory and the analysis and interpretation of the data related to the participant's interpretations. Our theoretical trajectory went from looking at Bandura's four sources of self-efficacy in the development of a pre-service teacher's belief in their capability (Watson & Marschall, 2019), to considering how the participant's self-schema adapted in response to his experience. What we show, then, through the process of the participant's interpretation of experience (sense-making and meaning-making), is how a self-schema adapts and responds to experience and context. This process in turn reveals how a pre-service teacher constructs a self-view of a future competent self, which we argue is consistent with Bandura's theoretical propositions about self-efficacy; or, specifically, that self-efficacy appears in this context to be an aspect of narrative self-schema.

We argue that this degree of depth in abductive IPA becomes all the more meaningful in single case studies. In this respect we used an instrumental case study approach which focuses on illuminating a particular research question (Stake, 1995) and which provides the means for uncovering unexpected aspects of phenomena that can disconfirm, question and trouble our longstanding assumptions and existing theories (Smith et al., 2009). As such, instrumental case studies lend themselves well to abductive research processes, which through a detailed examination of particular cases aim to develop an understanding of and provide explanations for any elements of surprise, which current theories struggle to account for or address (Tavory & Timmermans, 2014). These considerations were critical in this study which aimed to seek new theoretical avenues, provide new theoretical explanations and advance theory related to the process of teacher self-efficacy development.

Finally, since the goal of the study was theory advancement, we wish to address the issue of generalisability. It is often suggested that case studies provide no direct means for extrapolating findings

and hence provide no means for statistical generalisations (Yin, 2018). In a direct response to this argument, Yin warns us that cases should not be thought of as samples, as one would consider them in statistical generalisations, but “as the opportunity to shed empirical light about some theoretical concepts or principles, not unlike the motive of a laboratory investigator in conceiving of and then conducting a new experiment” (Yin, 2014, p. 40). In a similar way, Smith et al. (2009) argue that the development of all knowledge must necessarily start with the particular if one is to avoid fragmentation and misinterpretation of human life. Indeed, what is frequently forgotten is that intensive, instrumental case studies afford analytical generalisation (Yin, 2018). In this sense, case studies hold an important place in the construction and revision of theory (Platt, 1988). This study takes this position, recognising that what was already known and understood about the process of teacher self-efficacy development was limited and that a more in-depth, qualitative and theoretical engagement with the phenomenon from the perspective of the single-case study was necessary.

3.1. Research context and participant

This research is part of a larger project which considers the teacher self-efficacy development of four pre-service secondary mathematics teachers during their university-led initial teacher education programme between September 2018 and June 2019 and where both authors are lecturers. The programme leads to a *post-graduate certificate in education* (PGCE) qualification and a government credential, *qualified teacher status* (QTS). During the 36-week programme, pre-service teachers spend 80 per cent of their time in schools. Teaching on the course is done by faculty-based subject lecturers, school-based mentors (mathematics teaching specialists) and a school-based professional tutor (a member of the school leadership team who manages subject mentors in school and who also presents a programme of school-based professional studies for all pre-service teachers).

The project draws on multiple sources of empirical data, collected throughout the academic year, which we divided into five equal time ‘blocks’. Data included pre-service teachers’ written weekly reflections, weekly planning documents, five lesson observations and interviews (transcribed verbatim). Since the focus of the study was on the participant’s meaning making in relation to their experience and in the process of their self-appraisal, one might perhaps question the necessity to use weekly planning documents and lesson observations as data sources. However, as it was argued in some recent qualitative studies of teacher self-efficacy (e.g., Glackin & Hohenstein, 2018), we saw these data sources as playing an important role in providing the context for and in substantiating what was articulated by the participant. These data provided opportunities for observing and then questioning patterns in the development of behaviour (when, for example, the participant repeatedly planned to focus on addressing the same skill in his development) or possible discrepancies between the participant’s self-reports regarding their actions and what we observed. With that in mind, data were analysed in the following way: During each block, we regularly analysed the pre-service teachers’ written weekly reflections and lesson planning documents. At the end of each block, we observed pre-service teachers teach a lesson (recorded in field notes), which we also analysed. All pre-analysed data were then used to devise a semi-structured interview, which was conducted before the next block commenced. This meant that although data analysed using IPA stemmed predominantly from the participant’s written weekly

reflections and interviews, data from all the sources were referred to.

3.2. Participant

The participant, Jacob (pseudonym), enrolled onto the secondary mathematics initial teacher education programme in September 2018. Jacob was amongst four volunteers participating in the study. While all four participants’ data showed similarity in the narrative characteristics of their teacher self-efficacy development (for example, the role of identity in teacher self-efficacy development is illustrated in the case of Katie in Marschall [2021]), Jacob’s case was the most illustrative and could be thought of as an intensity case (Cohen et al., 2011) which allowed for a more in-depth exploration of the phenomenon in question.

Like all entrants to the programme, he already held an undergraduate university degree (an engineering degree in his case) with at least 50 per cent mathematical content. Jacob’s case is unique as is any other single case. We observed that he was a confident and ambitious individual who had high expectations of himself. During lesson observations, Jacob displayed calmness and composure. One aspect of this uniqueness is that, although Jacob is from a British family, he grew up in France. Having completed his secondary education there, he then moved to England to attend university. Jacob’s command of English is that of a native speaker.

Jacob had strong mathematics subject content knowledge (assessed on the basis of his university degree and through a subject audit) but due to his limited exposure to school mathematics in England, Jacob’s subject-specific vocabulary and his understanding of culture-specific pedagogy were limited at the time of the course – an aspect Jacob was often concerned about. This was particularly evident because the students that Jacob was teaching during the academic year were predominantly British and had been following the English curriculum.

3.3. Data analysis

Our initial thematic analysis was based on the four sources of self-efficacy, which we then reanalysed using abductive IPA. Rather than identifying semantic themes per se, we identified within the data extracts where Jacob reflected on events and experiences as part of the initial teacher education programme. This was primarily drawn from his weekly diary and from subsequent interviews. Jacob’s reflexive interpretation of events and experiences were assumed to represent the adaptation of self-schema as a reflexive and interpretative process as described above.

In our analysis, we drew on the reflective stages of IPA (Smith et al., 2009). There the “bandwidth of reflection” (p. 189) begins with *pre-reflective reflexivity*, as an immediate reflection or simply an awareness of consciousness. The next stage is signified by a *glancing at pre-reflective experience* as intuitive undirected reflection. *Attentive reflection* takes place when the experience is considered to be an “experience of importance” (Smith et al., 2009, p. 189). The final most reflective stage, *deliberate controlled reflection*, involves a more formal analysis, or phenomenological reflection on spontaneous immediate reflections. In focusing on Jacob’s early experiences in the classroom, we consider *attentive reflection* and *deliberate controlled reflection*. The experiences where poignant, significant and important, since they represented a first major step toward taking on professional responsibility. There was therefore an imperative to make sense of those and construct meaning, which also vividly involved the adaptation of his self-

schema as Jacob assimilated the experience into himself and imagined a future competent self. In other words, as well as identifying Jacob's interpretations of his experience, we also identified narrative aspects of Jacob's meaning making and how he constructed meaning biographically.

In the analysis that follows we begin with theoretical interpretations of Jacob's *attentive reflections* on his first classroom experience. This is followed by his more expansive *deliberate controlled reflections* in relation to this first teaching experience. In this analysis we are concerned with how Jacob learned to cope with the complexity of the classroom: how he made sense of momentary experiences in the present and how that sensemaking was affected by and allowed him to anticipate future events. In the particular example presented here, we illustrate Jacob's sensemaking about his capability to deal with particular tasks – mathematical instruction and classroom management, during which he wishes to engage in an active dialogue with students. What we observe in our data, and what we present here, is how for teacher self-efficacy is constructed in relation to these tasks, through the process of narrating, by making sense of the affective present, and weaving this with his past and his future (Märtsin, 2019). Hence, what we show here is how Jacob's processes of self-schema adaptation extended to a narrative and autobiographical interpretation of that experience. Within this we consider the theoretical basis of teacher self-efficacy and aspects of the nature of its development in the context of an adapting self-schema. We develop and justify this in the discussion section.

4. Analysis

4.1. Attentive reflections

Jacob's first experience in the classroom was in the fifth week of the programme, he was teaching a year 7 class how to multiply fractions and integers. Leading up to this Jacob had been observing lessons, attending lectures and teaching sessions in the faculty, and taking part in peer teaching exercises. The classroom experience was the first time Jacob took responsibility for a class (albeit under supervision); it was a significant event for him, as it would be for most pre-service teachers. In his reflective diary Jacob describes this experience and presents an assessment of his performance:

These explanations were not as clear as I would have liked: I found that it is quite difficult to think 'on the spot' and that my mathematical reasoning was affected by emotive factors – the stress of teaching a class for the first time and being observed.

Jacob states that the experience was stressful and involved heightened affect. It is not difficult to imagine (even if you have not had the experience yourself) the feelings that an inexperienced pre-service teacher might have during their first 'real' teaching experience. Jacob attributes the perceived limitations to his capacity to offer satisfactory explanations to heightened affect. In other words, his affective state undermined his capacity to think clearly. He further reflects:

... it is difficult to give live explanations about mathematics in front of a class, even when dealing with simple concepts. [...] I am a little worried at how difficult I found explaining multiplication of integers and fractions.

The above extract presents a first self-assessment of his perceived capability. He continues to attribute the limitations in this to his affective state, his stress, and heightened affect, and to

the classroom context. He also begins to identify a specific aspect of teaching that he may be deficient in – explaining how to multiply integers and fractions. In other words, there is indication here that while he attributes the stress to the classroom context, which in turn affected his ability to respond to students' questions, he pinpoints 'explanation' as an aspect of his practice that needs to be developed. This marks the beginning of a self-referential account of the source of his stress in the classroom. Jacob's reflections move the attribution from being mostly a result of the stressful context to contemplating himself as a contributing factor.

In a further reflection in the same diary entry, Jacob returns to the classroom context and the issue of classroom and behaviour management. He says:

There is certainly the comfort of feeling in control, and it is a lot easier than dealing with a noisy class. Calling the class to [be] quiet after discussion time, and animating Q&A session, I found much more difficult – I was no longer an officer but a moderator trying to give a direction to the social situation. I felt myself demoted by several ranks when I called the numerator the denominator (!) and had to afterwards correct myself. I got a bit flustered, and my explanations suffered.

From that initial reflection, where the stress of the classroom and being observed by an experienced colleague undermined his capabilities, Jacob develops and expands the account of himself as a contributing factor. In the opening reflection, Jacob observed himself, almost without agency or role in the context, and not unlike a cork bobbing about on a troubled sea. In the second and third extracts, he becomes increasingly reflexive and inserts himself into the context, as someone who is a part of it and who has a professional responsibility for it. He revisits the challenges and complexity of the classroom milieu as a potential source of stress, but acknowledges that classroom and behaviour management are his responsibility. The characterisation of this responsibility is represented by his sense of "demotion" of not being the "officer" with authority, with the capacity to "control" the class and have them quiet when he needed to talk. In this he acknowledges the limitations of his classroom management skills. In the above extract therefore, he recognises that the stress that caused his difficulties in thinking in-the-moment and providing effective explanations was in part a result of his limited capabilities in managing behaviour. There is also indication in both previous extracts that he recognises that pedagogical methods, such as 'explanation' represent knowledge and skills that he does not yet have. We refer to this subsequently as pedagogical knowledge or knowledge of instructional practices, which reflects pedagogical content knowledge (Shulman, 1986) or mathematics knowledge for teaching (Ball & Bass, 2000).

During the process of his reflection, however, Jacob further remarks: "Leading the class was an experience that I enjoyed but am still uneasy about". Clearly, the experience involved a mixture of emotions, which were a consequence of heightened affect. Not only was the experience stressful and challenging but it was also, after Jacob reflected upon it, perhaps assuring and certainly a little satisfying.

The attentive reflections above reveal a process of self-efficacy appraisal through enactive mastery experience. Jacob presents an assessment of his teaching capabilities, in which, as might be expected at this stage, he recognises his limitations. The task or aspect of teaching that was especially important to him was in relation to classroom management but there is also acknowledgement of limitations in his knowledge and skills in instructional practices. Overall, we can infer that, in spite of the challenges present during Jacob's first teaching experience, his self-efficacy is developing. The process of this development is through the reflexive self-diagnosis

presented above and from Jacob's overall assessment of the experience as positive but stressful.

The consideration of experience and 'attentive reflection' are important since they connect experience to Jacob's developing interpretation, and so they connect Jacob's experience to the process of adaptation of his self-schema. However, it is difficult to discern from the attentive reflection alone how Jacob's self-schema is adapting in response to his experience. For this, it is necessary to consider Jacob's 'deliberate controlled reflection', which involve further self-reflections and reflexivity, as we depict in the next section.

4.2. Deliberate controlled reflections

As Jacob's reflections and reflexivity develop in relation to his first teaching experience, he begins to reflect on his own mathematical knowledge and how he acquired it:

I've not followed the education in Britain and the maths curriculum in Britain, so I don't really know what people are used to or what's a typical way of teaching this or that. And it takes being able to observe someone do it before I do it. It's invaluable.

So, a week ago I didn't know all that much about British education [...] in this last week, I've observed teaching practices, so I am more aware of what works and what doesn't so much.

From this it can be seen how Jacob continues to attribute part of his perceived limitations in being able to offer explanations in response to students' questions about multiplying integers and fractions to his past experience. He adds, "... my unfamiliarity with British mathematics became a greater burden, and I mixed up some key vocabulary." As was becoming evident in the previous section, from his initial non-agentive reflections to increasingly reflexive narratives, Jacob identified pedagogical knowledge specific to mathematics as an area in which he saw himself to be lacking. Here, we start to see Jacob connecting his first teaching experience, and his attentive reflections on that experience, to his own sense of self and past experiences. This reflection assigns his difficulties to a perceived lack of relevant subject knowledge, which Jacob explains to be a result of him not being educated in England.

The following extract represents a further development and intertwining of the interpretative process of self-schema adaptation in terms of personal history, as well as more specific teacher self-efficacy assessments:

My school mathematics is a rather distant memory, and my degree level mathematics is tainted by a utilitarian approach. Furthermore, there will be some basic British methods and vocabulary that I may be unfamiliar with due to my French schooling. This need to develop or refresh my mathematical knowledge was also identified by my self-audit test, in which many points required revision or learning.

Consistent with the conceptualisation of teacher self-efficacy, as oriented toward a task, the content of the above diary extract presents an aspect of Jacob's teacher self-efficacy appraisal in relation to the specifics of pedagogical knowledge. Jacob identifies a perceived deficiency that could account at least in part for his stressful experience and he presents this in terms of his subject knowledge and as a corollary, his pedagogical knowledge. This develops, elaborates and strengthens the narrative which began in Jacob's attentive reflections earlier, where he accounted for his stressful experience in part as a result of his limited pedagogical knowledge. Here, he is explaining why he might feel deficient in

pedagogical knowledge on account of his past experiences. In other words, his explanation goes beyond assessments of his teaching capabilities, as was apparent in the attentive reflections in the last section, to providing an account that integrates a sense of who he is. The experience is accounted for within an overarching self-concept or self-schema, which is concerned more with the construct of himself as a totality – as a narrative identity. He expresses this in more generalised perspectives of himself:

The French side of me is fond of rigour, first-principle mathematics traditional seating plans, and bare classrooms.

This extract presents a totalising statement of who Jacob believes he is in relation to pedagogical approaches. This is where we can start to point to the adaptation of self-schema through an interpretative process which incorporates narrative meaning making in terms of Jacob's life history. This contrasts – although it is not incompatible with – the reflexive process through which self-efficacy is developed. This is an expression of who he believes he is, it is an expression of identity which is situated within a life history. Jacob presents further reflections on pedagogical approaches:

I realise that I have a similar pragmatic view of mathematics, which has been reinforced by my engineering degree, and that I am quick to skip proofs and conceptual understanding for the benefit of an efficient method and a quick result. I now better understand that this is a poor picture to present to pupils. I should instead teach the subject because in itself it is engaging and fulfilling, just like the NRICH¹ problems have been this week.

He refers to his familiarity with a 'utilitarian' approach, by which he means an instrumental approach to learning where the emphasis is on learning to be fluent in the use of mathematical methods. This he contrasts with more student-centred approaches that promote student thinking, investigation and problem solving and that he had been recently introduced to as part of the initial teacher education programme. Within this he suggests that student-centred approaches are potentially more engaging and potentially more 'fulfilling' than the more 'utilitarian' teacher-centred approaches that he had become familiar with in his past educational experiences. This extract also has a future orientation; Jacob is beginning to consider (or at least to express that internal conversation) the kind of mathematics teacher he is going to become. It is important to emphasise how these reflexive self-schema adaptations are connected to his recent experiences. They connect a 'present' and affective moment with his past and possible future selves in an ongoing personal narrative. His existing characterisation of the kind of teacher he is, a teacher with a utilitarian approach, is being challenged by imagining a future teacher using more investigative approaches. He begins to incorporate new possibilities into his outlook, or in other words, we see his view of himself and what he believes to be changing. While he might have seen himself as an authority in the classroom, as a conduit for mathematical knowledge and skills in the way that he was acculturated into, this is now developing to recognise that student behaviour, engagement and learning are dependent on the approach to teaching. Jacob does not centre this reflexivity on

¹ The NRICH mathematics education project is based in the Faculties of Mathematics and Education, University of Cambridge. It designs and develops 'rich' mathematical tasks that promote conceptual thinking and the development of problem-solving skills (see, <https://nrich.maths.org>).

specific teaching tasks and associated knowledge and skills, but considers his values and beliefs about the teaching and learning of mathematics.

Within the reflections on his first teaching experience, Jacob continues to reveal a positive evaluation of the development of teacher self-efficacy.

It's certainly a boost in confidence about how to manage a class for a full hour. And to survive, get to the end and be ok [...] Well ... It feels satisfying but also doesn't feel like I'm there yet. So, this has gone well and it definitely boosted my confidence and it is something I can praise myself on. But I'm thinking also that I'm going to have to do this with year 10 and year 11 at some point and that will be a different, a different ball game. And maybe I'm not there yet. My practice with this year 7, even though it was not perfect, they still behaved. Maybe I'm going to have to be even more decisive and more 'on it' when it comes to year 10 or 11.

This “boost in confidence” is a self-efficacy appraisal, which is specified by characterising classroom and behaviour management as a ‘task’. The development of teacher self-efficacy can be attributed to one of the four sources of self-efficacy, enactive mastery experience, which is often presented as a main or primary source of self-efficacy information. Despite the experience being challenging, and not necessarily presented as an overall success by Jacob, he has ‘experienced’ the context and can distinguish knowledge and skills from that classroom experience and from other aspects of the programme. From this he can recognise specific areas in which he can develop.

This, however, is just an aspect of the adaptation of a more general self-schema; one that has a narrative and biographical character. This represents the construction of a narrative sense of self. The following reflection, in which Jacob begins to look to a possible future self, illustrates this dimension:

... should I be an officer and lead the class in a rather demanding, strict way? Or should I be a moderator, giving more freedom and space for discussion? Is it not better, as a novice teacher, to prioritise being in control of the class, and with experience work towards the more delicate and difficult task of a self-regulating class? A bit more experience should help me find my feet here.

Within this, Jacob goes beyond a self-schema oriented toward

beliefs in capability specified around tasks, although these are evident in the reference to classroom management and the ‘control of the class’. Jacob also refers to a more generalised narrative self-schema: a future possible professional identity that is either more or less authoritarian (i.e., the ‘officer’ or the ‘moderator’).

The extracts from his written reflections and from interviews with Jacob present a reflexive encounter with himself in the context of the initial teacher education programme, specifically in relation to his first classroom experience. This involves attempts to resolve and reconcile ‘himself’ in response to an affective present, his past experience (or ‘past self’) with attention to who he might be in the future. This is not just a conceptualisation of being (and becoming) a competent professional with a belief in personal capability (i.e., teacher self-efficacy) in the tasks of teaching (e.g., classroom management, student engagement and instructional practices). It is also concerned with a general and ‘totalising’ sense of self – what kind of teacher he might become, his values and beliefs; this is frequently referred to as the development of a professional identity. On this basis, we argue that our analysis here shows that teacher-self-efficacy can be considered to be a task-oriented aspect of a more generalised narrative self-schema or narrative identity.

5. Discussion and conclusions

This study offers insights into the adaptation of a pre-service teacher's self-schema through an interpretative process. What we show is a relationship between teacher self-efficacy and a more generalised self-schema. Within this, teacher self-efficacy is oriented toward specific tasks and goals (Bandura, 1997), and the more general self-schema is concerned with a temporal continuity and totality of self, which is narratively organised (Märtsin, 2019), and which is consistent with what Sfard and Prusak (2005) refer to as a professional identity (see also Losano et al., 2018; Sfard, 2019). Our claim is that teacher self-efficacy can be considered as a task-oriented aspect of an overall narrative self-schema and that the process of its appraisal reflects narrative self-schemata construction. We represent this narrative process of teacher self-efficacy appraisal in Fig. 1. The upper part of the diagram illustrates the temporal past, present and future of narrative self-schema or professional identity; the lower part of the diagram illustrates the iterative nature of teacher self-efficacy appraisal and development. The connecting aspect is in relation to meaning making in the present. We think of this process in the following way.

Meaning making in terms of narrative self-schema involves the narration of self and the imagination of possible future selves

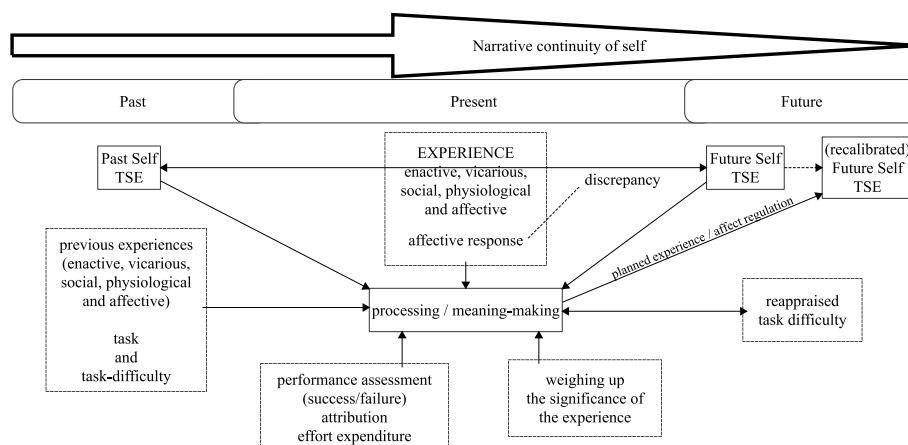


Fig. 1. A theoretical model of the narrative process of teacher self-efficacy appraisal.

alongside experience of the present and the past (Trzebinski, 1995). The means through which these questions of professional identity are addressed are heavily influenced by narrative imaginaries. Human beings are compelled to story and to 'biographise' their experiences in different aspects of their lives (e.g., as a professional) (Bruner, 1990; Polkinghorne, 1991; Ricoeur, 1994; Sfard & Prusak, 2005), where their past helps them explain the present and predict the future (Schechtman, 2005). The process of meaning making centres around the 'affective' present – an existential moment in which the individual confronts contextual complexity (Archer, 2000). Selective attention is required to manage or deal with the complexity and affect (Trzebinski, 1995). This selection is made through the perspective of the self-schema, which in turn responds and adapts to the momentary experience (Bandura, 1997). The affective present is connected to past experiences and an assessment of future actions in relation to who we think we are, who we aspire to be and how we wish to act (Archer, 2000).

Meaning making in terms of the development of teacher self-efficacy schemata is particular, centred around tasks and goals, and it revolves around enactive, vicarious, social, and somatic and affective experiences (Bandura, 1997). In terms of (teacher) self-efficacy appraisal, the affective experience of the moment represents a discrepancy between performative expectations and the reality (Archer, 2000; Bandura, 1997). This creates an imperative to identify and organize approaches to help reduce this discrepancy (Bandura, 1989). This implies a future orientation, in the need to identify the knowledge, skills and dispositions required to help manage similar anticipated affective experiences and act effectively in the future. This equates to an assessment of self-efficacy which relates current perceived capabilities and the nature of the task to projections of future competency. All these aspects are consistent with self-efficacy theory which, in the context of goal-driven, task-oriented behaviour, discusses self-efficacy adaptation (Bandura, 1997) and its fundamental role in human functioning and which relates to helping individuals develop coping mechanisms for managing their affective states (Bruce & Ross, 2008). This takes place through the construction of strategies and effective courses of action which transform the complexity of the environment and its affective potential from challenging to relatively benign (Bandura, 1997).

Yet, as Jacob's case illustrates, during the identification of tasks and goals within teaching, such as classroom management or instructional strategies (as described in Tschannen-Moran & Woolfolk Hoy, 2001), and the assessment of his enactive experience, a narrative is constructed which attempts to reconcile those with an overall sense of self. While assessing his capabilities in relation to specific tasks, Jacob was considering wider questions of: *Who am I? What is my role? What kind of person am I/will I be?* and, *What kind of teacher will I become?* In other words, what we show in our analysis is that teacher self-efficacy appraisal does not take place in absence of wider conceptualisations of self, a narrative self or narrative self-schema or professional identity. Consequently, we argue that as a task-oriented aspect of a narrative self-schema of the competent self, teacher self-efficacy, has a much closer relationship with narrative identity formation (Sfard & Prusak, 2005) than previously suggested. Moreover, as our research shows, the narrative self-schema is involved in the process of teacher self-efficacy appraisal but also undergoes a recalibration during this process. This implies a reciprocal relationship between the processes of narrative self-schema identity formation and self-efficacy development.

6. Further implications

This research has important implications for teacher education, as well as perhaps learning processes more generally. What we emphasise in this study is that in considering the development of teacher self-efficacy, in terms of developing capability in teaching tasks and in acquiring appropriate knowledge and developing skills, it is necessary to consider the more general aspects of a pre-service teachers' developing professional identity. In other words, it is essential to consider their narrative self-schemata. This means not only considering the effective acquisition of knowledge and skills but also paying attention to the kind of person that the pre-service teacher is, and the kind of professional they wish to become (Marschall, 2021). Knowledge, skills and judgements of personal capability (i.e., teacher self-efficacy) cannot be treated separately from the development of a professional identity which, as well as introducing possibilities for that future rendition of self, maintains a continuity with the present and past. This suggests that teacher educators should consider the interpretations that pre-service teachers offer as they reflectively and reflexively engage with context-based professional learning and as an imperative for initial teacher education programmes.

6.1. Limitations and future research

1. The role of four sources in teacher self-efficacy development

Primarily, in our analysis, teacher self-efficacy information comes from enactive mastery experience, which is generally recognised as the strongest source of teacher self-efficacy (Bandura, 1997; Bong & Skaalvik, 2003; Tschannen-Moran & Woolfolk Hoy, 2007; Usher & Pajares, 2008). We also allude to vicarious experiences in university sessions and workshops and from observing experienced teachers in the classroom. In this analysis, however, we are not able to explicate the processes through which teacher self-efficacy is developed via the remaining two sources. Firstly, we did not consider the appraisal of teacher self-efficacy based on information accessed via social persuasion. Secondly, while the role of affect is indicated, this research indicates that affective and physiological states have a more complex role in the development of teacher self-efficacy. This suggests something more than the oft-cited account that stress, tiredness and illness undermine self-efficacy, where 'affect' becomes central to the process of self-efficacy appraisal (Marschall, forthcoming).

Consequently, we suggest that it would be useful to investigate further the interpretative and meaning-making processes in relation to the four sources of teacher self-efficacy, to develop understanding or even a reconceptualization of the four sources (see, for example, Marschall, forthcoming).

2. The relationship between narrative self-schema, professional identity and teacher self-efficacy

To an extent the analysis presented here might indicate that the distinction or boundary between the narrative self-schema as a professional identity and teacher self-efficacy is somewhat blurred and might be characterised as porous. Further research into the relationship between narrative self-schema and professional identity (as well as in self-efficacy development) is needed.

7. Generalisability

Finally, we would like to offer some comment on the extent to which this research is generalisable. We claim that our analysis is a case of the interrelated self-schema adaptation and teacher self-efficacy development in the context of initial teacher education. Jacob clearly had a background that was unusual compared with other pre-service teachers, in that his education took place in a different jurisdiction which led to an unfamiliarity with the context. However, from our knowledge of our own practice as teacher educators and from our research into pre-service teachers' development, we strongly suggest that the adaptation of narrative self-schema and the development of teacher self-efficacy are interrelated processes for all pre-service teachers, but to a lesser or greater extent. Jacob was selected for this study as his case revealed this process vividly. The question then is how does the focus on a particular experience vis-à-vis Jacob's first teaching experience influence the extent to which we can generalise from this case. Again, we selected this event, since it vividly showed the process of interpretation and meaning making since the experience was so significant for Jacob. From our knowledge of the data in the wider project, we suggest that similar processes were taking place throughout the programme and therefore the development of teacher self-efficacy must be considered in the context of the adaptation of narrative self-schema and vice versa. We can really only make useful speculations as to the relationship between narrative self-schema and self-efficacy more generally and beyond initial teacher education and even beyond teaching and into other learning contexts. But it seems, based on this research, that such a relationship might exist more generally.

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