Teacher professional identity as multidimensional: mapping its components and examining their associations with general pedagogical beliefs

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ABSTRACT
Research on teachers' professional identity integrates many constructs that are treated independently in most cases. This study described the associations between components of teacher professional identity and their association with teachers' general pedagogical beliefs. Secondary teachers (n = 236) completed a survey about several components of their identity (self-efficacy beliefs, motivation to become a teacher, affective commitment and perceived type of expertise) and general pedagogical beliefs (constructivist and direct transmission). Multidimensional scaling revealed that the components could be mapped on two dimensions: form of motivation and degree of subject specificity. The resulting map revealed four meaningful groups of components. Furthermore, whereas direct transmission general pedagogical beliefs were found to be strongly tied to an identity grounded in the subject taught, constructivist beliefs were independent of identity components. This study provides new insight into the structure of teacher professional identity and its relevance for teaching.

1. Introduction and theoretical framework
Since the 1960s, the development of the “teacher self” has emerged as a topic of primary interest within educational research (Getzels and Jackson 1963; Woolfolk Hoy, Davis, and Pape 2006). Considered as “the totality of the individual” (VandenBos 2007, 827), the self makes and is the individual (James [1890] 2010). The teacher self comprises a multiplicity of components that form professional identity, including beliefs about the teacher's role, the subject matter and the students' learning (amongst other aspects of teaching). Beliefs that influence “how individuals characterise phenomena, make sense of the world, and estimate covariation” (Pajares 1992, 310) are reflected in the teacher's instructional practices. Indeed, the teachers' professional identity is at the core of their decisions and meaning making. According to some (e.g. Bullough 1997), it embodies the teacher's beliefs about teaching, learning and self-as-teacher. Even if the nature of the relationship between beliefs and practices is debatable, its existence is widely recognised in the literature (Buehl and Beck 2015;
The complexity of professional identity offers a wide variety of components to study. However, there is scant research on these components and their associations, even though such investigations offer a relevant way to access a deep comprehension of teachers’ beliefs and practices and, by extension, a means of improving teaching and learning quality.

The present study focused on a selection of major components that constitute a teacher’s professional identity (motivation, self-efficacy beliefs, sense of responsibility, affective commitment and perception of expertise), the interrelations among these components and the relationship between a teacher’s professional identity and general pedagogical beliefs. The latter constitute beliefs about the nature of education, teaching and learning (Chan and Elliott 2004). Although prior studies have tended to treat these components independently, beliefs are grounded in teacher professional identity (Richardson 1996). Furthermore, general pedagogical beliefs strongly determine teaching practices (Pajares 1992). Accordingly, the relationship between general pedagogical beliefs and components of identity deserves to be scrutinised.

1.1. Teacher professional identity

The notion of identity is strongly tied to the concept of self in that it refers to “an individual's sense of self defined by (a) a set of physical and psychological characteristics that is not wholly shared with any other person and (b) a range of social and interpersonal affiliations (e.g. ethnicity) and social roles” (VandenBos 2007, 827). As Olsen (2014) pointed out, identity determines and is determined by the way one perceives oneself.

Specifically, teacher professional identity is conceived as how teachers view themselves as teachers and how they are recognised as such (Beijaard, Meijer, and Verloop 2004; Beijaard, Verloop, and Vermunt 2000). Beijaard et al. highlighted that most researchers see professional identity as “an ongoing process of integration of the ‘personal’ and ‘professional’ sides of becoming and being a teacher” (2004, 113). To that, Day et al. (2006) added situated factors, considering the local conditions under which teachers are working (e.g. workload, career structure). Indeed, as a multifaceted identity, the teacher self manages multiple selves in building and performing professional identity.

The research is increasingly assuming that a knowledge and value crisis is occurring in Western societies nowadays (Martineau and Presseau 2004). Teachers, who used to be considered as “masters” of knowledge and culture, are confronted to a progressive loss of legitimacy (Périer 2013). As a consequence, professional identity is disrupted by the inability to keep the original role of teachers in line with the actual reality of teaching. Facing such evolution of teachers’ role is challenging the core of teacher professional identity. Furthermore, the personal, cultural, social and institutional factors influencing the teaching profession support the relevance of considering teacher professional identity as a complex and multifaceted construct. Accordingly, a multidimensional perspective was considered in the present study.

1.2. Components of teacher professional identity: a multidimensional perspective

The literature acknowledges the multiple factors contributing to or composing teacher professional identity and highlights specific aspects of the working and private lives that contribute to building it: subject matter, didactical and pedagogical expertise and beliefs about
teaching (Beijaard, Verloop, and Vermunt, 2000; Roeser, Marachi, and Gehlbach 2002). The motivation to become a teacher, self-efficacy beliefs, sense of responsibility, commitment to teaching and perception of expertise are the components of teacher professional identity scrutinised in the present study. These components were selected because they represent distinct and complementary aspects of identity, notably related to why a teaching career was chosen (motivation to become a teacher), how one perceive her/his capacity in the profession (self-efficacy beliefs), which moral values one attributes to the profession (sense of responsibility), how one is engaged as a professional and how one think about one’s own areas of expertise in teaching. This selection provides a broad, although not exhaustive, view of teacher professional identity. While other constructs, such as teachers’ goals (Roeser, Marachi, and Gehlbach 2002), could have been included as components, theoretical redundancy would have been problematic. Furthermore, other constructs sometimes studied as part of teacher professional identity, such as job satisfaction, were considered as outcomes of this identity and therefore not included as components.

1.2.1. **Motivation to become a teacher**

The motivation to become a teacher is an important component of professional identity, as it relies on the teacher’s perception of his/her role, competencies and beliefs about the task requirements. It reflects what one personally values in teaching. According to Eccles (2009) Expectancy Value Model of Motivated Behavioural Choice, expectations for success (achievement-related choices) and subjective task value are the principal motivations for becoming a teacher. Thus, the model presents identity as a motivational construct resulting from expectations for success and subjective task value (intrinsic, attainment, utility, relative cost), both acting as mediators between (a) cultural, social and personal characteristics and (b) tasks, activities and behavioural choices. Based on the same general expectancy value theory framework, according to the factors influencing the teaching choice (FIT-Choice) framework (Watt and Richardson 2007) and its adaptation (Berger and D’Ascoli 2012, Berger et al. 2017), the major forms of motivation for becoming a teacher are (a) intrinsic value (individual’s interest in teaching career), (b) social utility value (helping society and students improve), (c) personal utility value (work–life balance, job security), (d) subject interest (being motivated by the content one teaches), (e) choice by opportunity (being offered the opportunity to teach), (f) fallback career (becoming a teacher because another privileged option was not available) and (g) perceived teaching ability (individual’s perception of current and potential competence in teaching).

1.2.2. **Self-efficacy beliefs**

A teacher’s self-efficacy beliefs refer to those about his/her “ability to organise and execute the courses of action required to successfully accomplishing a specific teaching task in a particular context” (Tschannen-Moran, Woolfolk Hoy, and Hoy 1998, 233). Further refining this idea, Tschannen-Moran and Woolfolk Hoy (2001) added that a teacher’s self-efficacy belief concerns the desired outcomes for student engagement and learning. The construct of self-efficacy beliefs, a form of self-belief (Woolfolk Hoy, Davis, and Pape 2006), has been extensively investigated since the 1970s (Bandura 1977). Pajares articulated the relationship between beliefs and self as such: “People grow comfortable with their beliefs, and these beliefs become their ‘self’; so that individuals come to be identified and understood by the very nature of the beliefs, the habits, they own” (1992, 318).
The Ecological Model of Teacher’s Knowledge and Beliefs (Woolfolk Hoy, Davis, and Pape 2006) acknowledges that self-referenced beliefs are principally composed of identity and the perception of self-efficacy (Woolfolk Hoy, Davis, and Pape 2006). Therefore, teachers’ self-efficacy judgments influence the goals that they set for themselves (Woolfolk Hoy, Davis, and Pape 2006), teaching achievements (Armor et al. 1976), decision to continue in the same profession (Siwatu and Chesnut 2015), instructional practices (Midgley, Feldlaufer, and Eccles 1989) and, by extension, students’ outcomes, such as motivation to learn, self-regulation, achievement and persistence (Klassen and Tze 2014; Woolfolk Hoy, Hoy, and Davis 2009). While task value components (intrinsic, utility and attainment values) have been identified as predictors of choice in one’s teaching career, ability beliefs have stronger explanatory power (Eccles, Midgley, and Adler 1984).

How teachers perceive themselves influences their instructional practices, professional development and attitudes toward educational change (Beijaard, Meijer, and Verloop 2004). Teacher self-efficacy beliefs include a range of capabilities that “a good teacher” should have (Tschannen-Moran and Woolfolk Hoy 2001), such as instructional strategies, student engagement and classroom management skills. Part of the perception of professional identity derives from the ideal representation of the professional. Although the valued qualities may vary, they nevertheless revolve around circumscribed aspects of work. For instance, being a good teacher requires good management of students and time (Woolfolk Hoy, Davis, and Pape 2006), the ability to adapt to the students and listen to them and, in the case of vocational teachers, the mastery of technical competencies (Deschenaux and Roussel 2011). Recognising this complexity and aiming to examine profiles of teacher professional identity, Roeser et al. conceptualised clusters of different “types of professional identities” (2002, 215), that vary according to personal goal orientation (mastery-oriented and/or performance-oriented) and self-efficacy beliefs. They concluded that teachers with high self-efficacy and mastery orientation were likely to consider students’ social-emotional needs as part of their concerns as teachers.

### 1.2.3. Sense of responsibility

Concerns regarding educational outcomes mainly focus on the teacher as a principal source of both problems and solutions. In any case, teachers are target for change (Linn 2006; Prawat 1992). Therefore, the teacher’s personal responsibility refers to critical self-judgement; there is “a sense of internal obligation and commitment to produce or prevent designated outcomes or that these outcomes should have been produced or prevented” (Lauermann and Karabenick 2011, 127). Lauermann and Karabenick (2013) conceptualised teacher responsibility as a multidimensional construct constituted of responsibility for four outcomes: student motivation, student achievement, relationships with students and teaching quality. They showed that these components participate in building professional identity by giving a sense of the professional expectations and responsibilities of a teacher. Then, both the intrinsic (interest in the profession) and social (contribution to society) motivations to become a teacher affect the sense of responsibility (Girardet and Berger 2016). Teacher responsibility is additionally dependent on situational factors involving contextual and person influences, such as job autonomy, position in a hierarchy and locus of control. Having a positive relationship with the teacher’s self-efficacy beliefs (Lauermann and Karabenick 2013), teacher responsibility is part of the perceived role of “how a teacher should be”, and thus participates in defining teacher professional identity.
1.2.4. Commitment to teaching
The commitment to teaching is defined as a psychological attachment to the teaching profession (Coladarci 1992); in other words, it is the degree to which the teacher values and feels connected to the profession (Lamote and Engels 2010). Meyer, Allen, and Smith (1993) emphasised the importance of considering the commitment to the occupation as multidimensional, since it involves various forms of commitment: commitment as an affective attachment to the organisation, as a perceived cost associated with leaving the organisation, and as an obligation to remain in the organisation. As one component of teacher professional identity (Hong 2010; Lamote and Engels 2010), the commitment to teaching is tied to other components, such as self-efficacy beliefs (Bruinsma and Jansen 2010; Coladarci 1992; De Jesus and Lens 2005) and initial motivation to teach (Rots and Aelterman 2008). Research has shown that the degree of commitment to teaching can be predicted by a higher degree of initial motivation and greater self-efficacy beliefs. For instance, unfulfilled commitment appears to be a contributing factor to emotional burnout (Hong 2010). In addition, the longitudinal study conducted by Lamote and Engels (2010) with a group of pre-service teachers showed that commitment to teaching increased during the first semester of teacher education along with changes in other components of identity. The commitment to teaching should also theoretically relate to teacher responsibility, as strongly committed teachers probably have a higher sense of responsibility than less committed teachers. As it influences motivation and self-efficacy beliefs, teacher commitment represents a main component of identity.

1.2.5. Perception of expertise
According to Beijaard, Verloop, and Vermunt (2000), the teacher’s professional identity results from the threefold combination of expertise perceptions relating to subject matter, pedagogical aspects and didactical aspects. Self-evaluation affects the way the teacher sees him- or herself and then develops his/her professional identity. The place of subject matter expertise in teacher professional identity has undergone evolution in its social perception. Until some decades ago, it was a sufficient factor for being considered a competent teacher (Hoyle and John 1995). Recently, the conception of subject matter knowledge has been enriched by pedagogical content knowledge (Shulman 1986) – that is, knowing how to share knowledge, for example, by adapting the official study plan, developing adequate tasks and explaining things effectively. Pedagogical aspects are part of the teacher’s identity because the latter arises from the perception of the teacher’s role. Didactical expertise is perceived as a main component of the teacher’s identity because teachers learn the profession through didactical models of what “being a good teacher” is (Beijaard, Verloop, and Vermunt, 2000). In sum, teachers’ perceived type of expertise represents a singular way to define and then gauge teacher professional identity, acknowledging its plural aspects.

1.3. Teacher professional identity and general pedagogical beliefs
Given that teachers’ beliefs can be influenced by some components of identity (Woolfolk Hoy, Davis, and Pape 2006) that then affect their instructional practices, articulation of their professional identity and beliefs deserves to be deepened. Richardson (1996) argues that three categories of experience influence knowledge and beliefs about teaching: personal experience, formal education and formal knowledge. Personal experience affects beliefs
about the self, perception of the world and relation to others; it acts as a learning-from-life process. Formal education (i.e. schooling and instruction) relates to beliefs about teaching based on one’s experiences as a student. Finally, formal knowledge influences beliefs in that it relates to understandings agreed upon as true by a community of scholars.

General pedagogical beliefs concern the nature of education, teaching and learning (Chan and Elliott 2004) – in other words, beliefs about what learning is and how teaching is best delivered. Following the Teaching and Learning International Survey (TALIS; OECD 2009) and Chan and Elliott (2004), two broad types of general pedagogical beliefs – constructivist and direct transmission beliefs – can be distinguished. Constructivist beliefs about teaching relate to viewing students as active participants in the process of acquiring knowledge and stressing the development of thinking processes more than the acquisition of specific knowledge. Direct transmission beliefs relate to viewing the student as a passive recipient and the role of the teacher as communicating knowledge in a clear and simple way, explaining right solutions and making sure that the classroom is calm and the students are focused. The general beliefs that teachers hold about the nature of teaching and learning might explain why they favour certain instructional practices; in other words, beliefs shape teachers’ practices. Involving the cognitive, motivational and epistemological factors responsible for conceptual changes in regard to teaching (Patrick and Pintrich 2001), the effects of the teacher’s beliefs on classroom behaviour, instruction and students’ learning are strong (Kagan 1992; Nespor 1987; Patrick and Pintrich 2001). The results of the OECD’s (2009) TALIS study are highly relevant here, as they indicated that constructivist beliefs about teaching were significantly related to so-called student-oriented practices and enhanced activities, whereas direct transmission beliefs predicted structuring practices (providing a highly organised learning environment for students). Furthermore, in most of the participating countries, constructivist beliefs were positively related to greater self-efficacy among teachers (Schleicher 2015). Other studies have added to this conclusion by showing that teachers with higher self-efficacy beliefs employ more instructional practices based on constructivism than those related to direct transmission, where students have a passive role (Nie et al. 2012). Thus, both self-efficacy and general pedagogical beliefs impact instructional practices. Besides the association with self-efficacy beliefs, few studies have investigated how the components of identity relate to general pedagogical beliefs.

According to some researchers (Hong 2010; Lamote and Engels 2010), general beliefs about teaching and learning are parts of a teacher’s professional identity. Beliefs and experience influence the mental state driving a person’s actions and are consequently determinants in the constitution of a self-as-teacher (Richardson 1996). In the present study, instead of considering general pedagogical beliefs as part of teacher professional identity, we investigated the relationships between the latter and the components of identity.

2. Aims and research questions

Teachers’ beliefs are central to their instructional practices and, by extension, to their students’ learning. Considering the persistent lack of clarity about the components of the teacher’s professional identity and their effects on professional practices, this study focuses on how they are structured and how they relate to the teacher’s pedagogical beliefs: What is the dimensional structure of the teacher’s professional identity? How are the components of the teacher’s professional identity related to general pedagogical beliefs? To answer the
first question, the relationships among the components of teacher professional identity (motivation, self-efficacy beliefs, perception of expertise, sense of responsibility and commitment to teaching) were investigated using multidimensional scaling (MDS). The correlations between the professional identity components and general pedagogical beliefs were then investigated, in addition to the placement of the components in the MDS map.

3. Method

3.1. Participants and procedure

The participants were 236 teachers (124 pre-service general secondary school teachers and 112 in-service vocational) in their first year of teacher education in the French-speaking part of Switzerland in two teacher education institutes: one for vocational teachers and the other for secondary teachers. Their mean age was 36 years and 1 month (SD = 9 years, 1 month; \( M_{\text{vocational teachers}} = 40 \text{ years, 10 months} \), \( M_{\text{pre-service secondary teachers}} = 32 \text{ years, 3 months} \)). The sex distribution was 47.1% women, 51.2% men and 1.7% unknown (33.3% women among vocational teachers; 58.8% women among pre-service secondary school teachers). Their self-reported prior teaching experience was 2 years and 2 months (SD = 3 years, 5 months; \( M_{\text{vocational teachers}} = 4 \text{ years, 1 month} \), \( M_{\text{pre-service secondary teachers}} = 1 \text{ year, 10 months} \)) and ranged from no experience at all to 18 years at the time of the survey.

The study took place during class time and lasted about one hour. During their first weeks of teacher education, the participants were asked to share their demographic characteristics and complete a survey including the scales described below. They were provided with written information about the nature and purpose of the study and informed that they could withdraw at any time. Participation was neither mandatory nor remunerated.

3.2. Instruments

The components of the teacher’s professional identity and general pedagogical beliefs were all assessed by self-reported scales validated in prior studies when mentioned or adapted from validated instruments.

3.2.1. Motivation to become a teacher

Based on prior empirical studies (Berger and D’Ascoli 2012, Berger et al. 2017), an adapted version of the FIT-Choice scale (Watt and Richardson 2007) was used to assess seven types of motivation: (a) aptitude (three items; sample item: “Teaching is a career suited to my abilities”), (b) intrinsic value (three items; sample item: “I am interested in teaching”), (c) social utility value (five items; sample item: “I want a job that involves working with adolescents”), (d) personal utility value (four items; sample item: “Teaching hours fit with the responsibilities of having a family”), (e) subject interest (four items; sample item: “Teaching allows me to combine my interest in the domain and a job”), (f) opportunity (four items; sample item: “Favourable circumstances brought me to teaching”) and (g) fallback career (five items; sample item: “I chose teaching as a last-resort career”). The answers were rated on a seven-point scale (1 = Not at all important; 7 = Extremely important) and preceded by the item stem “I chose to become a teacher because …” Cronbach’s alpha, number of items per scale and descriptive statistics are displayed in Table 1 (see Section 4). Information about the factorial validity can be found in Berger et al. (2017).
Table 1. Descriptive statistics and zero-order correlations.

|                  | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| **Motivation to teach** |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Aptitude         | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Opportunity      | −0.04 | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Intrinsic value  | 0.54  | −0.17 | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |
| Personal utility value | 0.25  | 0.24  | −0.06 | 1.00  |       |       |       |       |       |       |       |       |       |       |       |
| Social utility value | 0.46  | 0.06  | 0.53  | 0.24  | 1.00  |       |       |       |       |       |       |       |       |       |       |
| Fallback career  | −0.21 | 0.40  | −0.39 | 0.25  | −0.12 | 1.00  |       |       |       |       |       |       |       |       |       |
| Subject interest | 0.18  | −0.05 | 0.16  | 0.15  | 0.29  | −0.20 | 1.00  |       |       |       |       |       |       |       |       |
| **Identity-related components** |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Teacher self-efficacy | 0.38  | −0.03 | 0.31  | 0.11  | 0.40  | −0.13 | 0.18  | 1.00  |       |       |       |       |       |       |       |
| Sense of responsibility | 0.06  | −0.15 | 0.18  | 0.05  | 0.24  | −0.01 | 0.04  | 0.19  | 1.00  |       |       |       |       |       |       |
| Commitment to teaching | 0.31  | −0.15 | 0.33  | 0.08  | 0.27  | −0.10 | 0.14  | 0.37  | 0.19  | 1.00  |       |       |       |       |       |
| Perceived subject exp. | 0.09  | 0.03  | 0.02  | −0.01 | 0.00  | −0.16 | 0.21  | 0.12  | −0.07 | 0.06  | 1.00  |       |       |       |       |
| Perceived didactical exp. | 0.08  | −0.02 | 0.12  | −0.06 | 0.18  | −0.12 | 0.13  | 0.23  | 0.00  | 0.07  | 0.37  | 1.00  |       |       |       |
| Perceived pedagogical exp. | 0.16  | 0.02  | 0.08  | 0.02  | 0.23  | −0.04 | −0.02 | 0.23  | 0.11  | −0.01 | 0.02  | 0.58  | 1.00  |       |       |
| **General pedagogical beliefs** |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Direct transmission | 0.07  | −0.03 | 0.04  | 0.07  | 0.06  | −0.05 | 0.09  | 0.15  | 0.01  | 0.21  | 0.26  | 0.14  | −0.11 | 1.00  |       |
| Constructivist   | 0.00  | 0.18  | 0.02  | −0.04 | 0.07  | 0.02  | 0.03  | −0.01 | 0.04  | −0.10 | −0.02 | 0.03  | 0.17  | 1.00  |       |
| M                | 5.43  | 3.87  | 6.12  | 3.95  | 5.43  | 2.23  | 5.08  | 4.51  | 5.961 | 4.29  | 71.81 | 56.49 | 61.80 | 3.68  | 4.74  |
| SD               | 0.90  | 1.44  | 0.96  | 1.34  | 0.97  | 1.23  | 1.28  | 0.60  | 13.04 | 0.53  | 21.74 | 22.30 | 24.19 | 0.75  | 0.57  |
| A                | 0.77  | 0.77  | 0.86  | 0.75  | 0.74  | 0.82  | 0.77  | 0.86  | 0.79  | n/a   | n/a   | n/a   | n/a   | 0.65  | 0.63  |
| Possible range   | 1–7   | 1–7   | 1–7   | 1–7   | 1–7   | 1–7   | 1–7   | 1–6   | 0–100 | 1–6   | 0–100 | 0–100 | 0–100 | 1–6   | 1–6   |

Notes: N = 247. r ≥ .13, p < .05; r ≥ .17, p < .01; r ≥ .21, p < .001.
3.2.2. **Self-efficacy beliefs**

The French translation (Dumay and Galand 2012) of the 12-item short version of the Ohio State Teacher Efficacy Scale (Tschannen-Moran and Woolfolk Hoy 2001) was used. Self-efficacy beliefs about classroom management and student engagement were both assessed with four items. The four items assessing the original self-efficacy beliefs for instructional strategies were replaced by four items developed for this study to assess self-efficacy beliefs for instructional planning (sample item: “I feel able to select content whose difficulty is adapted to the learner’s level”). The answers were rated on a six-point scale (1 = totally disagree; 6 = totally agree), preceded by the item stem “Considering my recent realisations, resources, and opportunities as a teacher, I feel able to …”. The total score was used to represent teacher self-efficacy beliefs.

3.2.3. **Sense of responsibility**

The 12-item French version of the Teacher Responsibility Scale (Lauermann and Karabenick 2013; see Vaudroz and Berger forthcoming for information about the factorial validity) was used. The translation was based on a forward–backward process to ensure that the meaning of the original items was not altered. The participants were requested to gauge the extent to which they felt personally responsible for four types of educational outcomes, with three items per outcome: student motivation (sample item: “A student of mine did not value learning the subject I teach”), student achievement (sample item: “A student of mine had very low achievement”), having positive relationships with students (sample item: “A student of mine did not believe that I truly cared about him/her”) and the quality of their teaching (sample item: “A lesson I taught failed to reflect my highest ability as a teacher”). The answers were rated from 0 (Not at all responsible) to 100 (Completely responsible) and preceded by the item stem “I would feel personally responsible if …”

3.2.4. **Commitment to teaching**

A four-item scale was translated from Karabenick (2007), assessing the degree to which the participants were committed to teaching (sample item: “Being a teacher is a major part of who I am”).

3.2.5. **Perceived type of expertise**

Based on the items developed by Beijaard, Verloop, and Vermunt (2000), three types of expertise (see 1.2.5.) – (a) subject expertise (defined as “A subject matter expert is a teacher who bases his/her profession on subject matter knowledge and skills”), (b) didactic expertise (defined as “a teacher who bases his/her profession on knowledge and skills regarding the planning, execution and evaluation of the teaching and learning processes”) and (c) pedagogical expertise (defined as “a teacher who bases his/her profession on knowledge and skills to support students’ social, emotional and moral development”) – were assessed each by one item. The answers were rated from 0 (Not at all responsible) to 100 (Completely responsible) and preceded by the item stem “I define myself as …” Contrary to Beijaard, Verloop, and Vermunt (2000) study, in which the respondents were requested to provide a total of 100 points across the three types of expertise, each rating was done independently from the other two ratings.
3.2.6. General pedagogical beliefs
Twelve items were adapted from the French translation (See Berger and D’Ascoli 2012 for information about the factorial validity) of items from the TALIS study (Jensen et al. 2012) and from Chan and Elliott’s (2004) study to assess (a) direct transmission beliefs (six items; sample item: “Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp easily”) and (b) constructivist beliefs (six items; sample item: “Students learn best by finding solutions to problems on their own”). The participants rated each item on a six-point Likert scale (1 = totally disagree; 6 = totally agree). One of the items assessing direct transmission beliefs was removed because it did not load on any of the factors according to confirmatory factor analysis (CFA).

3.2.7. Demographics
The participants reported their years of teaching experience, age and sex. The stream of education (vocational or general) was identified after the data collection.

3.3. Data analysis
The data analysis comprised three steps. First, given that the factorial validity of all the instruments scales was found to be adequate in prior studies, the mean scores were computed and Cronbach's alphas were estimated. Second, the association between the components of identity, general pedagogical beliefs and demographic characteristics (age, teaching experience, sex, stream of education) was computed using Pearson’s correlations (age, teaching experience) and MANOVA (using sex and stream of education as independent variables). Note that the focus was not on investigating differences between sexes or streams of education but on gauging their importance in the scores before performing the main dimensional analysis. Finally, MDS analysis was performed using the ALSCAL procedure (Euclidian distance) available in IBM SPSS 22©. This procedure is exploratory; that is, using MDS to discover underlying structures in the data. 5

4. Results
Table 1 shows the descriptive statistics of the scales and the zero-order correlations between the scales’ scores, which constitute the basis of the MDS analysis.

4.1. Characteristics and professional identity components
The correlations of professional identity components with age and teaching experience revealed that age was significantly related to opportunity (r(236) = .30, p < .001) and constructivist beliefs (r(236) = .14, p = .03), whereas teaching experience was related to perceived pedagogical expertise (r(236) = .18, p = .01) and opportunity (r(236) = .16, p = .01). The mean scores and related standard deviations by stream of education and by sex are shown in Table 2.

MANOVA was used to test the association between sex and stream of education and the components of professional identity and general pedagogical beliefs. No direction of causality was assumed. The results revealed the main statistical effects of stream of education (Pillai’s Trace F(15,218) = 7.406, p < .001, η2p = .34) and sex (Pillai’s Trace F(15,218) = 2.39,
Table 2. Descriptive statistics by stream of education and sex.

| Motivation to teach                  | Stream of education | Sex          |
|--------------------------------------|---------------------|--------------|
|                                      | VET                 | Secondary ed.|
|                                      | M       | SD   | M       | SD   | M       | SD   | M       | SD   |
| Aptitude                             | 5.36   | 0.88 | 5.49   | 0.92 | 5.42   | 1.02 | 5.43   | 0.78 |
| Opportunity                          | 4.48   | 1.19 | 3.32   | 1.42 | 3.61   | 1.47 | 4.12   | 1.37 |
| Intrinsic value                      | 6.09   | 0.94 | 6.15   | 0.97 | 6.14   | 1.08 | 6.08   | 0.83 |
| Personal utility value               | 3.76   | 1.39 | 4.01   | 1.57 | 4.17   | 1.58 | 3.66   | 1.38 |
| Social utility value                 | 5.44   | 0.90 | 5.44   | 1.03 | 5.41   | 1.08 | 5.45   | 0.86 |
| Fallback career                      | 2.06   | 1.17 | 2.37   | 1.28 | 2.11   | 1.20 | 2.35   | 1.27 |
| Subject interest                     | 5.00   | 1.24 | 5.14   | 1.33 | 5.35   | 1.22 | 4.86   | 1.29 |
| Identity-related components          |         |      |        |      |        |      |        |      |
| Teacher self-efficacy                | 4.51   | 0.60 | 4.53   | 0.61 | 4.55   | 0.63 | 4.48   | 0.58 |
| Commitment to teaching               | 4.78   | 0.76 | 4.88   | 0.80 | 4.94   | 0.78 | 4.73   | 0.77 |
| Sense of responsibility              | 61.67  | 16.06| 64.32  | 11.28| 63.96  | 12.97| 62.12  | 14.57|
| Perceived subject expertise          | 72.59  | 21.84| 73.07  | 20.11| 71.15  | 20.49| 74.05  | 21.19|
| Perceived didactical expertise       | 55.79  | 20.62| 59.25  | 22.65| 57.68  | 21.01| 57.42  | 21.88|
| Perceived pedagogical expertise      | 60.56  | 22.53| 64.26  | 24.83| 62.69  | 24.25| 62.30  | 23.16|
| General pedagogical beliefs          |         |      |        |      |        |      |        |      |
| Constructivist                       | 4.87   | 0.59 | 4.64   | 0.53 | 4.69   | 0.55 | 4.80   | 0.60 |
| Direct transmission                  | 3.67   | 0.67 | 3.70   | 0.82 | 3.64   | 0.75 | 3.71   | 0.76 |

$p = .003, \eta^2_p = .14$), in addition to an interaction effect of stream of education and sex (Pillai’s Trace $F(15,218) = 1.955, p = .02, \eta^2_p = .12$). Univariate analyses of variance indicated that there were three significant differences between the two streams of education: (a) opportunity was rated higher by vocational teachers than by secondary teachers ($F(1,232) = 43.437, p < .001, \eta^2_p = .16$); (b) fallback career was rated lower by vocational teachers than by secondary teachers ($F(1,232) = 5.763, p = .02, \eta^2_p = .02$); (c) constructivist beliefs were rated higher by vocational teachers than by secondary teachers ($F(1,232) = 8.35, p = .004, \eta^2_p = .04$). Regarding sex, females attributed more importance to personal utility value than males did ($F(1,232) = 4.119, p = .044, \eta^2_p = .02$); moreover, subject interest was more relevant in the females’ choice to become a teacher than it was for the males ($F(1,232) = 8.932, p = .003, \eta^2_p = .04$). Finally, fallback career was higher for males than for females ($F(1,232) = 4.005, p = .047, \eta^2_p = .02$). Two significant interactions of the factors stream of education with sex were found: (a) social utility value was rated higher by male than female vocational teachers, while the opposite pattern was observed in secondary teachers ($F(1,232) = 6.769, p = .01, \eta^2_p = .03$); (b) in secondary teachers, commitment to teaching was higher for females than
for males, while such differences were not observed in vocational teachers ($F(1,232) = 4.366, p = .038, \eta^2_p = .02$).

In sum, the relationships between individual characteristics and components of identity were found to be mostly non-significant or of a small effect size. The only exception is the difference in opportunity between streams of education, with the latter explaining 16% of the variance in the scores. Given these observations, the MDS analysis did not include demographics; instead, it focused on professional identity and general pedagogical beliefs variables as described above.

4.2. Multidimensional scaling analysis

Solutions including 1–4 dimensions were estimated using SPSS 22. Stimulus coordinates were plotted for each solution and each component in order to interpret them. A two-dimension solution was retained (stress = .26; squared correlation = .60) based on comparative interpretability of the one to four dimensions solutions (Davidson 1983). While a higher number of dimensions systematically increased how the data fit the model, the decision about the number of dimensions to retain is a trade-off between statistical model fit and theoretical meaningfulness. The best solution was selected considering this trade-off. Stimulus coordinates are mapped in Figure 1 and reported in Table 3.

The dimensions of the model can be interpreted as follows. Dimension 1 refers to the form of motivation: the opposition between extrinsic and intrinsic motivations (and variables conceptually tied to this motivation, such as aptitude or commitment to teaching). This is a classical distinction in the motivational literature (Deci and Ryan 1985). The relatively large number of variables related to motivation to teach might be responsible for the prominence of this first dimension in the model. Variables related to the subject taught fall in between (around the middle of dimension 1). Dimension 2 refers to the degree of subject specificity, interpreted as the opposition of components at a rather general level (e.g. constructivist beliefs, perceived pedagogical expertise) vs. components at a more specific level, which focus on the specific subject taught (notably perceived subject expertise, subject interest motivation).

![Figure 1](image-url)
Thus, these two dimensions are found to discriminate among the variables, which MDS uses to show the degree of similarity among the constructs.

5. Conclusion and discussion

By adopting a multidimensional view of teacher professional identity (Beijaard, Verloop, and Vermunt, 2000; Canrinus et al. 2011; Hong 2010; Lamote and Engels 2010; Roeser, Marachi, and Gehlbach 2002), we used MDS to test for the existence of a structure among the components of teacher identity. Furthermore, since two populations of teachers were considered, their scores on the scales representing the components of teacher professional identity were compared. These comparisons revealed minor differences in the levels of the variables; therefore, professional identity had a very similar intensity in the two populations of teachers. The main exception was an interaction between the importance of choice and opportunity, which constituted a relevant motivation to become a teacher only in those teaching in the vocational context (Berger and D’Ascoli 2012). Globally, the results provide a rich, innovative description of teacher professional identity.

5.1. Organisation of professional identity components

Our primary objective was to identify the organisation of a teacher’s identity components. MDS analysis allowed us to identify sets of factors composing teacher professional identity. The results reveal that two dimensions might represent the associations between the identity components. The first one, “subject-specific to subject-general”, is organised around factors relating to subject matter or, by contrast, with pedagogical matter in general. The second dimension, “extrinsic motivations to intrinsic motivations”, involves factors relating to an extrinsic form of motivation or, contrariwise, with intrinsic values. Constructivist beliefs are

| Table 3. Stimulus coordinates per dimension. |
|---------------------------------------------|
| Dimension | Forms of motivation | Degree of subject specificity |
| --- | --- | --- |
| 1 | 2 |
| **Motivation to teach** | | |
| Aptitude | 1.54 | 0.14 |
| Opportunity | 1.12 | 0.17 |
| Intrinsic value | -1.26 | 0.15 |
| Personal utility value | -1.89 | 0.02 |
| Social utility value | 0.77 | 0.54 |
| Fallback career | -2.17 | 0.40 |
| Subject interest | 0.34 | -0.97 |
| **Identity-related components** | | |
| Teacher self-efficacy | 0.78 | -0.06 |
| Commitment to teaching | 1.05 | -0.52 |
| Sense of responsibility | 0.61 | 1.33 |
| Perceived subject expertise | -0.15 | -1.50 |
| Perceived didactical expertise | 0.24 | -0.99 |
| Perceived pedagogical expertise | 0.20 | 1.20 |
| **General pedagogical beliefs** | | |
| Constructivist | -0.92 | 1.55 |
| Direct transmission | -0.25 | -1.46 |
an isolated factor, indicating that they are largely independent from professional identity components.

As shown in Figure 1, we identified four groups of variables in the model: (a) atypical motivations, (b) pedagogical identity, (c) core identity and (d) subject-related identity. Each group is located in a specific space of the MDS figure. Starting from the left side, the atypical motivations group includes three types of motivation to teach (fallback career, opportunity and personal utility value). These motivations are not among the most popular ones, according to previous studies on the motivation to become a teacher (Berger and D’Ascoli 2011; Watt and Richardson 2007). Thus, they are qualified as atypical because they do not correspond to the values one can generally find in the teaching profession (Berger and D’Ascoli 2011). Interestingly, their association reveals that these motivations contribute conjointly in the teacher professional identity. Atypical motivations have their own space in the MDS map, meaning that they are independent from other identity components. Also remarkable is the relative distance between fallback career and opportunity (both passive motivations; Berger et al. 2017) on one hand, and personal utility value on the other hand. The subject-related identity group, at the bottom of the figure, is constituted of direct transmission beliefs, perceived subject expertise, perceived didactical expertise and subject interest motivation. Except for direct transmission beliefs, all the components are related to the topic taught, which tells us that these components represent an identity grounded in the content one is teaching (Beijaard, Verloop, and Vermunt, 2000; Grier and Johnston 2003). The pedagogical identity group, at the top of the figure, comprises only two variables: perceived pedagogical expertise and sense of responsibility. In contrast to the subject-related identity group, this group is made of components unrelated to the topic taught. The more one feels one is an expert in pedagogy, the more one feels responsible for one’s teaching, the students and their outcomes. This makes sense, as pedagogy consists of educational practices aimed at the development of a student’s personality, values and morals, for which teachers need to take responsibility beyond imparting their subject knowledge (Beijaard, Verloop, and Vermunt, 2000). Finally, the core identity group, on the right, comprises self-efficacy beliefs, commitment to teaching, aptitude, social utility value and intrinsic value (Woolfolk Hoy, Davis, and Pape 2006). These three motivations are rated as the most important ones. Note that social utility value is also close to the pedagogical identity group, and it might make sense to be a part of this group. However, this motivation was attributed to the core identity group, as it is closer to self-efficacy beliefs and aptitude than to sense of responsibility. These components are frequently used for representing teacher professional identity (Hong 2010; Woolfolk Hoy, Davis, and Pape 2006); the results of the present study provide further evidence of their strong association. Remarkably, the three motivations are tied to self-efficacy beliefs and commitment, which corroborates prior research (Bruinsma and Jansen 2010; De Jesus and Lens 2005; Rots and Aelterman 2008; Watt and Richardson 2007).

5.2. General pedagogical beliefs and components of identity

In terms of correlations, as reported in Table 1, the results suggest that general beliefs about teaching and learning relate significantly to the three perceptions of expertise (subject matter, pedagogical and didactical) defined by Beijaard, Verloop, and Vermunt (2000). Notably, higher perceived expertise in any of the three types is associated with higher direct transmission beliefs. Conversely, higher constructivist beliefs are related to lower perceived
subject expertise, but also higher opportunity motivation. When analysed together using MDS, a subject-related cluster emerged including direct transmission beliefs with perceived expertise in the subject and in didactics (subject-specific), but not in pedagogy.

Contrary to Nie et al.'s (2012) results, constructivist beliefs were not found to relate to self-efficacy; neither are the latter correlated with the other type of general pedagogical beliefs (i.e. direct transmission beliefs). In fact, constructivist beliefs were found to be independent of the components of identity examined in this study. This suggests that these beliefs are not part of one's identity, and thus their merging into identity (Hong 2010) is not warranted. In contrast, direct transmission beliefs were found to be tied to subject-related identity, signifying that an identity grounded in the topic taught implies a specific perspective on teaching and learning. A potential explanation is that since the participants were all secondary school teachers, and therefore all had a disciplinary background, they saw their task as strongly based on the idea of transmitting their specialised knowledge, with less emphasis on constructivist principles.

5.3. **Study limitations**

Several limitations of this study should be considered. First, we offer a static view of teacher professional identity that overlooks factors influencing identity over time, such as teaching experience. Second, there is limited consideration of the contextual influences. Third, given the importance of the topic taught in our conclusions on teacher identity, generalisability is not warranted to primary education teachers. Finally, the four identity groups identified in the study depend on the variables used to represent the components of identity. Accordingly, the addition of some components might create a slightly different picture of identity. Future research will look at the development of teacher professional identity over time, and specifically during teacher education.

5.4. **Implications**

This study considered components that are often treated independently in the literature. It shows the coherence of teacher professional identity components and how the subject taught matters to teachers' general pedagogical beliefs. Furthermore, it reveals how teacher professional identity relates to general pedagogical beliefs, and notably its independence from constructivist beliefs, which are valued by teacher education programmes. Studying the contrast in identity between primary and secondary education teachers (specialised in a topic) is necessary to understand how the association with general pedagogical beliefs differs between these populations of teachers. Thus, understanding the components of teacher professional identity contributes to the research on teachers’ professional development.

**Notes**

1. A belief is “a proposition that is accepted as true by the individual holding the belief” (Richardson 1996, 104).
2. We rely on Beijaard, Verloop, and Vermunt (2000) definition of pedagogy and didactics. Pedagogy has moral and ethical features; it concerns multiple aspects related to the teacher's involvement with the students, but also how the teacher communicates with the students or
his/her implication in helping to solve the students' personal problems. In contrast, didactics concern models of teaching that “prescribe how the planning, execution, and evaluation of lessons should be done” (Beijaard, Verloop, and Vermunt, 2000, 752). These models are grounded in a discipline or a topic. The shift toward more learner-centred teaching illustrates a recent didactical development adopted in the teaching of many disciplines.

3. Intrinsic, utility, and attainment values are components of the construct of task value (Eccles and Wigfield 2002). Intrinsic value is “the enjoyment the individual gets from performing the activity or the subjective interest the individual has in the subject” (120). Utility value concerns “how well a task relates to current and future goals, such as career goals” (120). Finally, attainment value refers to “the personal importance of doing well on the task” (119).

4. This modification was done to fit with the themes of the larger research project in which this study is embedded: instructional planning and classroom management.

5. According to Giguère, “In essence, MDS is a technique used to determine a n-dimensional space and corresponding coordinates for a set of objects, strictly using matrices of pairwise dissimilarities between these objects” (2006, 26). “MDS assists the researcher in determining the perceived relative position of a set of objects or items (Hair et al. 1995). If two items are similarly rated by respondents, they will be located in multidimensional space in a way that the distance between them is smaller than the distance between other pairs of items. The resulting perceptual map indicates the relative positioning of all items. The researcher then interprets the underlying dimensions in a way that best explains the positioning of items in the map” (Martin et al. 2005, 367).

Disclosure statement
No potential conflict of interest was reported by the authors.

Funding
This work was supported by Schweizerischer Nationalfonds zur Förderung der Wissenschaftlichen Forschung [grant number 100019_146351].

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