Teachers’ engagement in professional learning: Exploring motivational profiles

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1. Introduction

Society today requires professionals to constantly adapt their knowledge and skills to the ever-changing environment they act in. This also holds for the professionals that work in school environments as teachers. Teachers are expected to deal with changing pupil populations, expanding knowledge fields, new responsibilities, and higher social expectations of schools (OECD, 2005). According to Guskey (2002, p. 381) “policy makers increasingly recognize that schools can be no better than the teachers and administrators who work within them”. To ensure an effort towards the best possible education for their students, teachers are thus required to invest time in continuous professional learning. We define teacher professional learning (TPL) in accordance with Hoyle and John (1995) as the process by which teachers acquire the knowledge, skills, and values that will improve the service they provide to their students.

TPL inevitably involves teachers being engaged in learning activities, both formal and informal. Learning activities are considered formal when they involve prescribed learning frameworks, organized events, teacher presence, the award of credit, or an external specification of outcomes (Eraut, 2000). Informal learning is typically not highly structured and the control of the learning lies with the learner. This study focuses on deliberative informal learning (i.e. learning for which time is specifically set aside), even though much informal learning is unintentional or implicit (Eraut, 2000; Tynjälä, 2008). Informal learning has been shown to affect teachers’ knowledge, beliefs, and (intentions for) practices (Bakkenes, Vermunt, & Wubbels, 2010).

Kwakman (2003) found that teachers do not always make full use of the possibilities for learning provided by their environment. She suggested that this finding could be explained by schools not fulfilling the required conditions that stimulate teachers to engage in TPL. Another possibly related explanation is that teachers are not motivated enough or experience a non-optimal type of motivation to ensure continuous TPL (cf. Gagné & Deci, 2005). However, empirical evidence for these explanations is lacking.

In this study, therefore, the relationship between teachers’ perceptions of their environment, their motivation, and their engagement in TPL is investigated. Specifically, we take the widely employed self-determination theory as a theoretical starting point to investigate to what extent secondary school teachers are motivated to engage in TPL. To explore the quality and strength of teachers’ motivation, we seek to identify profiles of the motivational dimensions of self-determination theory that teachers have in relation to TPL. These profiles are then related to the three basic psychological needs that, according to self-determination theory, need to be fulfilled by the environment to ensure high quality motivation. Finally, the motivational profiles are related to teachers’ engagement in TPL.
1.1. Teachers’ motivation for TPL

Few studies have investigated teachers’ motivation for their own learning (Vermunt & Endedijk, 2011). An indication that motivation for TPL may be problematic in some secondary school teachers is provided in a small scale study by Van Eekelen, Vermunt, and Boshuizen (2006), who have found a group of teachers that are unwilling to learn. Several reasons for teachers’ (non)engagement in professional learning have been identified in studies of teacher learning in contexts of educational reform. For example, teachers who do not feel ownership or go through a process of sense-making with regard to an educational innovation, will be less engaged in learning activities that lead to implementing that innovation (Ketelaar, Koopman, Den Brok, Beijaard, & Boshuizen, 2013). Fullan (2007) and Lieberman and Pointer Mace (2008) emphasize the importance of teachers perceiving innovations as meaningful in this respect. The difference between the present study and this research is that we investigate professional learning that does not follow from top-down implemented innovations. Furthermore, the research discussed above does not explicitly conceptualize motivation as such.

Studies that do focus on teachers’ motivation mainly investigate the broad domain of motivation for teaching, of which TPL is only a part (see Watt & Richardson, 2008). On the other hand, research is published on teachers’ motivation for specific TPL activities, rather than on TPL as a whole. Lam, Cheng, and Choy (2010), for example, investigated teachers’ motivation to persist in project based learning. Even though teachers’ motivation for the profession and specific TPL activities probably reflect some of their motivation for TPL as a whole, its empirical investigation remains scarce.

1.2. Self-determination theory

The theoretical starting point of this study is self-determination theory (SDT; Ryan & Deci, 2000, 2002). Deci and Ryan (2000) define motivation as the initiation of, and persistence in behaviour in order to attain a desired outcome or goal. Motivation is approached as a multidimensional construct, which implies that individuals may have multiple reasons for engaging in behaviour. In the case of TPL, a teacher may collaborate with colleagues to improve his lessons because of the enjoyment he experiences in relation to that collaboration. This would be an example of intrinsic motivation, the display of behaviour because of the inherent satisfaction of the behaviour itself. In contrast, extrinsic motivation is the display of behaviour to attain some separable outcome. Teachers may have both intrinsic and extrinsic motivations for professional learning. As such, the choice for SDT as a theoretical framework is in line with Van Eekelen, Boshuizen, and Vermunt (2005), who state that “our teachers’ learning experiences are never completely self- or externally regulated” (p. 464).

Extrinsic motivation is subdivided into three types of regulation that vary as a function of how much a reason for engaging in behaviour is integrated with the self (Ryan & Deci, 2000). Consider a teacher who enrols in a course because of the consequential increase in salary or because instructed to do so by the supervisor. These reasons for following the course are totally external from the self. Therefore, this is designated external regulation. If the same teacher started the course because to do otherwise would give rise to feelings of shame or guilt in relation to colleagues, the reason for engagement would already be closer to the self (i.e., more self-determined), but not yet fully integrated with it because of the important part other teachers play in the individual teacher’s activation. These reasons for engagement are labelled introjected regulation. Another example of introjected regulation is acting out of competition. Finally, teachers may engage in TPL because they consciously value it as a behavioural goal or accept it as personally important, for example in relation to their career. This type of regulation is termed identified regulation. Again, this type of regulation is more self-determined than the previous (Rigby, Deci, Patrick, & Ryan, 1992; Ryan & Deci, 2002). Often, the combination of intrinsic motivation and identified regulation is designated autonomous motivation, and external and introjected regulation are synthesized as controlled motivation (Vaansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009).

As noted by Vansteenkiste et al. (2009), autonomous motivation is associated with a host of positive outcomes such as psychological well-being, persistence, and deep learning. Controlled motivation, on the other hand, has been related to more negative outcomes such as superficial cognitive processing, less determination, and lower achievement. Furthermore, Deci and Ryan (2000) note that the more the regulation of behaviour is integrated with the self, the better it will be maintained over time and the higher resulting commitment and performance will be.

In SDT, the extent to which a teacher experiences the different dimensions of motivation depends on the fulfillment of three psychological needs by the teacher’s environment. These needs comprise the need for autonomy (i.e., perceiving that one is the origin of one’s own behaviour), the need for competence (i.e., feeling effective in on-going interactions with the social environment and experiencing opportunities to exercise and express capacities), and the need for relatedness (i.e., feeling connected to others, caring for and being cared for by those others, and having a sense of belongingness both with other individuals and with one’s community) (Ryan & Deci, 2002). As displayed in Fig. 1, when fulfillment of these needs is low, external regulation is experienced. When the environment pits autonomy and relatedness against each other, so that the possibility of feeling related depends on giving up autonomy (e.g., when a teacher is only accepted by colleagues when he does as they require), introjected regulation is the result. When feelings of autonomy and relatedness are harmoniously achieved, this will lead to identified regulation (Koestner & Losier, 2002). For intrinsic motivation the need for relatedness plays a less central role, and the need for competence is more important. In addition, intrinsic motivation can only be achieved when a learning activity is experienced by teachers as interesting, novel, or mildly challenging (Ryan & Deci, 2000).

1.3. A profile approach to motivation

The primary difference between SDT and other theories of motivation is the focus on the relative strength of different types of motivation, rather than on the total amount of motivation (Gagné & Deci, 2005). Several studies have found that individuals may experience multiple types of motivation for a certain behavioural domain. As such, teachers can be assumed to have motivational profiles in relation to TPL. These profiles are characteristics of individual teachers and may vary in the degree to which each dimension of motivation is manifested.

![Fig. 1. Hypothesized relations between basic needs and dimensions of motivation in SDT.](image-url)
Matsumoto and Takenaka (2004), and Ntoumanis (2002) investigated motivational profiles in relation to physical exercise, Moran, Diefendorff, Kim, and Liu (2012) studied work motivation, and Vansteenkiste et al. (2009) focused on motivational profiles for student learning. Three to five profiles were discerned in all studies. All studies found a profile in which intrinsic motivation and identified regulation (i.e., autonomous motivation) were high and introjected and external regulation (i.e., controlled motivation) were low(er). This profile was labelled ‘self-determined motivation’ (Matsumoto & Takenaka, 2004; Moran et al., 2012; Ntoumanis, 2002) or ‘high quality motivation’ (Vansteenkiste et al., 2009). Moreover, all studies found a profile with higher manifestations of controlled motivation compared to autonomous motivation. This profile was labelled, for example, ‘nonself-determined motivation’ (Matsumoto & Takenaka, 2004). Finally, three studies found a profile in which values of motivational dimensions were moderate, and consequently labelled it ‘moderate motivation’ (Matsumoto & Takenaka, 2004; Moran et al., 2012; Ntoumanis, 2002).

In line with earlier self-determination theory research, these studies found that profiles high on intrinsic motivation and identified regulation had high levels of favourable outcomes whereas profiles high on external and introjected regulation did not. As such, teachers would ideally have a motivational profile in which external and introjected regulation are relatively low and identified regulation and intrinsic motivation are relatively high.

Investigating profiles of motivational dimensions is theoretically interesting because it may uncover subgroups of individuals that are not represented by whole-sample characteristics such as means. From an applied perspective the identification of motivational profiles will be of use when designing interventions to increase teachers’ motivation for TPL, as it will allow for better tailoring towards specific groups of teachers (cf. Vansteenkiste et al., 2009). The same line of reasoning is followed by Rickards, Den Brok, and Fisher (2005) who state that reflection on teachers’ behaviour may be enhanced if information regarding that behaviour is presented in various ways. One of these ways is the use of profiles ‘which are powerful tools for reflection because they can be used to conceptualize complex and interrelated information, (...) because they can summarize information into (smaller) chunks that are easier to comprehend, and because they can stimulate associations with the teachers’ own knowledge if they are accompanied with powerful labels’ (p. 268).

1.4. Motivation and professional learning behaviour

As noted above, motivation is the initiation of and persistence in behaviour in order to attain a desired outcome or goal (Deci & Ryan, 2000). According to this definition, being motivated is irrefutably related to intentional behaviour. Since TPL inevitably involves learning, this study will focus only on teachers’ deliberative learning activities that contribute to their professional learning (for a further discussion of intentionality of learning activities see Eraut, 2000). Research has identified specific activities that fit this conceptualization of TPL. Evers, Kreijns, and Van der Heijden (submitted for publication), building on the work of Kwkman (2003), distinguished between reading, work-related training, experimenting, reflecting, and collaborating with colleagues. This qualification is in line with other research on teachers’ learning activities that also distinguished between individual versus collaborative activities, formal and informal activities, and receptive and constructive activities (Bakkenes et al., 2010; Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009; Lohman & Woolf, 2001; Vermunt & Endeldijk, 2011).

1.5. Research questions

In this study, we adopt a profile approach to motivation to investigate to what extent secondary school teachers are motivated for TPL. This has led us to apply a person-centred analytical approach. Person-centred analyses aim at identifying unobserved subgroups of individuals who are similar with respect to certain indicator variables (Muthén & Muthén, 2000). In our case, these variables are the different dimensions of motivation in self-determination theory. We then investigated whether the discerned subgroups with distinguishable motivation profiles differ with respect to antecedents (basic psychological needs) or outcome variables (TPL engagement). In sum, this study seeks to answer the following research questions:

To what extent are secondary school teachers motivated for professional learning?

a. What qualitatively different profiles of motivational dimensions can be distinguished among teachers in relation to TPL?
b. To what extent is teachers’ profile membership related to their basic psychological need satisfaction?
c. To what extent do teachers that have different motivational profiles for TPL differ in their TPL engagement?

Based on previous research we expect around four profiles to be present in our data. These profiles may be similar in nature to those found in earlier research (see Section 1.3). However, because of the different population, behavioural domain, and analysis techniques in the current study, the exact nature of these profiles is difficult to predict. Theoretically, it would be surprising, however, if we were to find a motivational profile in which one type of motivation is high, and closely related motivations are low. For example, we do not expect the occurrence of high introjected regulation and low external regulation and identified regulation in one profile. Second, we expect that teachers experiencing high autonomy and competence will be more intrinsically motivated, teachers with high autonomy and relatedness will display more identified regulation, teachers with low autonomy and high relatedness will show more introjected regulation, and teachers with low autonomy and low relatedness will be more externally regulated (Koezner & Losier, 2002). Finally, we expect that teachers in profiles with more autonomous motivation relative to controlled motivation will show more engagement in TPL behaviour than teachers in other profiles (Ryan & Deci, 2000; Vansteenkiste et al., 2009).

2. Methods

2.1. Sample and procedure

The sample for this study was achieved from a representative database4 of 23,426 Dutch secondary school teachers, who were sent an e-mail with a request to participate. In this e-mail teachers were notified that their information would be treated confidentially and that they could enter a lottery for an incentive worth around €500 upon completion of the digital questionnaire. Questionnaires were completed by 2360 teachers (10.03%) from 99 schools. This sample size is adequate for the analytical purposes of this study (e.g., Kline, 2011, p. 12). Although the non-response necessitates conclusions about the population at large to be drawn tentatively, the findings and analysis may resonate with teacher profiles in similar circumstances and be enlightening for both educational practice and research.

Table 1 shows that the mean age is higher and the percentage of male teachers is lower in the achieved sample than in the population. Teachers of a wide array of subjects were represented in the sample. These included languages (e.g., English), art, music, sports, humanities (e.g., history), science subjects (e.g., mathematics), and practical subjects (e.g., car mechanics). Finally, teachers from all types of secondary education in the Dutch school system participated in the study. These types roughly translate to special education, practical education, pre-

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4 This database was provided by Onderwijs Innovatie Groep [Education Innovation Group], OIG supports organizations in the Dutch educational market with research and solutions.
vocational secondary education, senior general secondary education, and pre-university education. Students taught in these types of education generally range from 12 to 18 years of age. Table 1 also shows an overrepresentation of teachers with a teaching qualification of the second and first level. The Dutch teaching qualification of the second level permits teaching pre-vocational secondary education and the first three years of senior general secondary education and pre-university education. The teaching qualification of the first level allows teachers to teach all years and all types of secondary education. Teachers without a qualification are underrepresented.

2.2. Measures

2.2.1. Engagement in TPL

Self-reported engagement in TPL was the first topic in the questionnaire. Through this ordering we sought to establish respondents’ understanding of what was meant by TPL (i.e., the different activities that it comprises in this study) before they filled out consecutive measures, all of which referred back to TPL. Engagement in TPL was measured by means of the TPDP#Work scale (Evers et al., submitted for publication). This questionnaire measures how often teachers engage in learning at work by asking them how often they perform certain learning activities. Specifically, these activities are reading (i.e., ‘studying subject matter literature’), work-related training (i.e., ‘participating in a course that centres around subject matter pedagogy’), experimenting (i.e., ‘testing alternative teaching materials in class’), reflecting (i.e., ‘adapting my teaching methods in response to pupils’ reactions’), collaborating with colleagues to improve the lesson (i.e., ‘preparing lessons with colleagues’), and collaborating with colleagues to improve school development (i.e., ‘thinking about the design and method of pupil guidance with colleagues’). Items were measured on a Likert-type answering scale ranging from 1 ‘almost never’ to 4 ‘often’. Reliability and factorial validity of the scale were established by Evers et al. (submitted for publication). We replicated these results by means of a reliability analysis and confirmatory factor analysis (CFA). Standardized factor loadings ranged between .51 and .81. As is displayed in Table 2, Cronbach’s alphas for all subscales and fit indices for the factor model were satisfactory.

2.2.2. Motivation for TPL

Teachers’ motivation for TPL was measured using the Academic Self-Regulation Scale (Vansteenkiste et al., 2009). This scale was adapted for the purpose of the present study. To this end, the original sentence ‘Why are you studying in general? I’m studying …’ preceding each item was replaced by ‘I work on my professional development …’. In addition, the scale was translated into Dutch. A back translation by a native English-speaking colleague resulted in a few minor adjustments.

The questionnaire consists of 16 items measuring external regulation, introjected regulation, identified regulation, and intrinsic motivation. Each construct was measured by means of four items, all rated on a Likert-type answering scale ranging from 1 ‘completely not applicable to me’ to 5 ‘completely applicable to me’. Items were presented randomly to avoid measurement effects. CFA and reliability analysis were performed to assess the construct validity and reliability of the scale. Two items – “because I’m supposed to do so” (external regulation) and “because I want others to think I’m smart” (introjected regulation) – were excluded from further analyses because of their relatively low standardized factor loadings, which resulted in fit-indices that did not reach acceptable levels. The low factor loading of the first item could be explained by the fact that ‘being supposed to’ can refer to reasons totally external from the self, but also to self-relevant feelings such as shame or guilt (introjected regulation). The low factor loading of the second item can be explained by the fact that teachers are not concerned with what others think of them, because of the individualistic nature of the teaching job. The factor model without these two items is reported in Table 2, as are reliability measures. Cronbach’s alphas and fit indices indicate good reliability and construct validity of the questionnaire. Standardized factor loadings ranged between .44 and .92.

2.2.3. Basic psychological need satisfaction

The extent to which the teachers’ environment satisfies their basic psychological needs in relation to their learning was measured using the Basic Psychological Needs Scale (M. Vansteenkiste, personal communication, September 2012). This questionnaire was developed as a cross-culturally valid measurement of basic psychological needs. It consists of 24 items measuring autonomy, competence, and relatedness. Each construct was measured using eight items, four positively stated

Table 1
Descriptive statistics of the achieved sample compared to population parameters.

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<tr>
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<th>Population</th>
<th>Sample</th>
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<tbody>
<tr>
<td>Mean age</td>
<td>45.4</td>
<td>49.45</td>
</tr>
<tr>
<td>Males</td>
<td>57.2%</td>
<td>53.8%</td>
</tr>
<tr>
<td>1st level qualification</td>
<td>40.8%</td>
<td>47.0%</td>
</tr>
<tr>
<td>2nd level qualification</td>
<td>45.2%</td>
<td>50.6%</td>
</tr>
<tr>
<td>No qualification</td>
<td>8.8%</td>
<td>2.4%</td>
</tr>
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</table>

Note: Population parameters were derived from the Dutch database of educational labour market information (http://www.stamos.nl). The percentages of teacher qualifications in the population do not add up to 100% because the database also categorizes teachers that teach in secondary education with a licence for primary education.

Table 2
Reliability analyses and confirmatory factor analyses of all scales in this study.

<table>
<thead>
<tr>
<th>Reliability analysis</th>
<th>Confirmatory factor analysis</th>
</tr>
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<tbody>
<tr>
<td>α</td>
<td>χ²(df), p</td>
</tr>
<tr>
<td>ASRS</td>
<td></td>
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<tr>
<td>External regulation</td>
<td>.80</td>
</tr>
<tr>
<td>Introjected regulation</td>
<td>.72</td>
</tr>
<tr>
<td>Identified regulation</td>
<td>.86</td>
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<tr>
<td>Intrinsic motivation</td>
<td>.93</td>
</tr>
<tr>
<td>BNS</td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>.83</td>
</tr>
<tr>
<td>Competence</td>
<td>.80</td>
</tr>
<tr>
<td>Relatedness</td>
<td>.85</td>
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<tr>
<td>TPDP#Work</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>.72</td>
</tr>
<tr>
<td>Work related training</td>
<td>.75</td>
</tr>
<tr>
<td>Experiencing</td>
<td>.81</td>
</tr>
<tr>
<td>Reflecting</td>
<td>.67</td>
</tr>
<tr>
<td>Collaborating: Lesson</td>
<td>.57</td>
</tr>
<tr>
<td>Collaborating: School</td>
<td>.77</td>
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</tbody>
</table>

Note: ASRS = Academic Self-Regulation Scale; BNS = basic psychological need satisfaction; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual. For acceptable model fit CFI and TLI should be > .90, RMSEA should be < .08, and SRMR should be < .05.
and four negatively stated. Items were scored on a Likert-type answering scale ranging from 1 ‘completely not applicable to me’ to 5 ‘completely applicable to me’. For the purpose of the study each item measuring autonomy and competence was preceded by the sentence ‘With respect to my professional development...’. The items measuring relatedness were adapted so that they would be applicable to the purpose of this study. For example, the original item ‘I feel the relationships I have are just superficial’ was changed to ‘I feel the relationships I have with people who are involved in my professional development are just superficial’. Items were presented randomly to avoid measurement effects. We performed a CFA that accounted for method effects of negatively stated items by allowing the error variances of these items to covary. We also performed a reliability analysis. Results of both analyses are displayed in Table 2 and show reliability and construct validity of the questionnaire. Standardized factor loadings for this questionnaire ranged between −.27 and .88.

Finally, the questionnaire contained a single yes/no question asking the participants whether they would be willing to participate in future studies. Analysing this variable in relation to the measures of motivation enabled us to draw tentative conclusions about a possible bias in this study’s sample with regard to motivation for TPL.

2.3. Analysis

In order to answer the research questions in this study, a Latent Profile Analysis (LPA) was performed on scale variables of the measures in Mplus 6 (Muthén & Muthén, 2010). For a comprehensive conceptual discussion and application of LPA the reader is referred to Pastor, Barron, Miller, and Davis (2007) and Marsh, Lüdtke, Trautwein, and Morin (2009). A more rigorous substantive discussion is provided by Magidson and Vermunt (2002), Vermunt and Magidson (2002), and by McLachlan and Peel (2000).

LPA is a person-centred analysis technique akin to, but with multiple advantages over, cluster analysis (Magidson & Vermunt, 2002; Pastor et al., 2007). As such, the goal of LPA is to identify subgroups of individuals that have a similar pattern of responses (profiles) regarding key variables (indicators). The indicators, in our case, are the different dimensions of motivation. The LPA model estimates means and (co)variances of indicators, the proportion of the total sample that can be represented by each given profile, and the posterior probability of each case belonging to a certain profile. A theoretical model is specified a priori and then the fit of that model to the data is evaluated. The profiles that result from the LPA are represented in the model as a latent categorical variable (C) that can take values of K = 1 to K = n. Model A in Fig. 2 represents the model that is tested in the current study.

In this study, we have chosen a model in which indicator means and variances within profiles are estimated freely (see Pastor et al., 2007 for a detailed discussion of possible parameterizations). Indicator covariances are also estimated but constrained to be equal across profiles. This constraint is applied because there is a theoretically assumed underlying structure among the dimensions of motivation. This structure implies that a dimension of motivation has a strong positive relation with dimensions that are conceptually close to it and weaker or negative relations with more distant dimensions (Ryan & Grolnick, 1987, p 892). For example, external regulation is positively related with introjected regulation, but has a zero or negative correlation with identified regulation and intrinsic motivation.

2.3.1. Determining the number and shape of profiles

To determine the number of profiles in the data, a sequence of models was tested starting with one profile (K = 1) and ending with the number of profiles that is reasonable to expect based on theory and previous findings. Informed by previous cluster analytical studies of self-determination theory, which have found three to five clusters of motivational dimensions (Matsumoto & Takenaka, 2004; Moran et al., 2012; Ntoumanis, 2002; Vansteenkiste et al., 2009), in this study models were estimated up to K = 5.

Subsequently, the profiles in each of the solutions were evaluated in consideration of theory, sample size, and uniqueness. The fit of the models was evaluated by means of several fit indices. These indices included the Akaike Information Criterion (AIC; Aikaike, 1974), the Bayesian Information Criterion (BIC; Schwarz, 1978) and the Sample-size adjusted Bayesian Information Criterion (SBIC; Sclove, 1987). For these indices smaller values mean better fit of the model to the data. Finally, we adhered to two additional criteria for model selection suggested by Pastor et al. (2007), namely the Lo–Mendell–Rubin likelihood ratio test (LMRT) and the entropy statistic. The LMRT is a significance test of the null-hypothesis that there is no increase in model fit between models with K − 1 and K profiles. The entropy statistic is based on the posterior probabilities of cases belonging to profiles and indicates the classification utility of a model. For this statistic higher values represent more accurate (or certainty of) classification of cases into profiles. For the entropy statistic, no cut-off value has been set in the literature.

2.3.2. Investigating the relation between profiles, antecedent variables, and outcome variables

To investigate the relation between profile membership and basic need satisfaction, the variables measuring the three basic needs and an interaction term between autonomy and relatedness were added to the final LPA model as covariates. This model is displayed as Model B in Fig. 2. The paths between the covariates and the latent categorical variable represent a multinomial logistic regression (Marsh et al., 2009). As such, in the final LPA model with all covariates, the probabilities of teachers having a certain combination of motivational dimensions (i.e., a profile) are estimated, given their pattern of responses about basic need satisfaction.

Several models with covariates were tested following the procedure of sequential logistic regression (Tabachnick & Fidell, 2007, p. 454). First autonomy was added as a predictor of having a certain profile, next relatedness, then the interaction between autonomy and relatedness, and finally competence. The reason for this was that autonomy is theoretically the most important predictor of all dimensions of motivation, relatedness is important for external, introjected, and identified regulation, and competence only predicts intrinsic motivation (see Fig. 1; Koestner & Losier, 2002). The best model was chosen based on AIC, BIC, and SBIC fit indices, and χ²-tests of the −2 log likelihood difference between consecutive models.

When considering the inclusion of covariates in LPA models, Lubke and Muthén (2005) note that the assigned class membership of a
participant is model dependent and not an innate quality of the participant, meaning that the inclusion of covariates can alter the classification of teachers into profiles. In addition, the inclusion of covariates may alter the shape of profiles altogether. Marsh et al. (2009) strongly suggest that variables should only be included as covariates to the model if there is a strong theoretical assumption that the causal ordering is from the covariates to the latent groups. In this study, this is the case with basic psychological need satisfaction. The causal effects of the satisfaction of competence, autonomy, and relatedness on the different motivational dimensions have been established in many previous studies (Ryan & Deci, 2002). The relation between motivation and TPL engagement, however, has not yet been demonstrated in empirical research. When there is no strong assumption about causality of covariates, or the shape of profiles is altered as a consequence of adding covariates to the model, it is recommended that variables are included in the analysis as auxiliary variables (Marsh et al., 2009). Auxiliary variables are variables that are not included in the model, but for which equality of means is tested across latent profiles (Muthén & Muthén, 2010, p. 497). It will therefore first be investigated whether including the basic psychological needs in the model affects the shape of the profiles. If this is the case they will be analysed as auxiliary variables. The different TPL activities will only be analysed as auxiliary variables.

3. Results

3.1. Relations between constructs

Table 3 shows the univariate correlations between all constructs investigated in this study. These results provide preliminary insight into the hypothesized relations between variables. Shown relations between motivational dimensions are in line with theory. External regulation is positively related to introjected regulation and negatively to identified regulation and intrinsic motivation. Introjected regulation is positively related to identified regulation and intrinsic motivation, and there is a strong positive association between identified regulation and intrinsic motivation. Moreover, the relation between the three basic needs and external regulation is negative, and becomes more positive towards the intrinsic end of the continuum. Finally, external regulation has a zero or negative correlation with all types of TPL engagement, whereas for the other motivational dimensions this association is positive. We found a similar pattern of associations between the motivational dimensions and willingness to participate in future studies.

Table 3

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<tr>
<td>3.68(0.08)</td>
<td>.42**</td>
<td>.43**</td>
<td>.388(0.67)</td>
<td>−.46*</td>
<td>−.10**</td>
<td>−.32**</td>
<td>−.28**</td>
<td>−.23**</td>
<td>−.26**</td>
<td>.31**</td>
<td>.26**</td>
<td>.23**</td>
<td>.24**</td>
</tr>
<tr>
<td>1.09(0.53)</td>
<td>.49**</td>
<td>.388(0.67)</td>
<td>−.16*</td>
<td>−.18*</td>
<td>.207(0.89)</td>
<td>.15*</td>
<td>.239(0.99)</td>
<td>.402(0.79)</td>
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<td>1.00</td>
<td>.01</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
</tbody>
</table>

Note. Means and standard deviations (in parentheses) are presented on the diagonal.

3.2. Motivational profiles for teacher professional learning

The results of the latent profile analyses are displayed in Table 4. The fit indices and LMRT, all favour the five-profile solution. However, the entropy statistic is higher for the K = 4 than the K = 5 solution. In addition, upon inspection of the profiles in the K = 5 solution, two profiles showed similarity in terms of indicator means and variances. No interpretable distinction could be made between these two profiles based on these outcomes. Therefore the four-profile solution was considered to be the best valid model. A graphical representation of the means in this solution is presented in Fig. 3a. Variances of the dimensions of motivation in the four different profiles are presented in Table 5. In the first profile the means of identified regulation and intrinsic motivation are extremely high, external regulation is low, and introjected regulation is medium. In addition, the variance of intrinsic motivation in this profile had to be constrained to be greater than zero (in our case 0.01) in order to reach convergence of the model. This indicates that all teachers in this profile have the most extreme score on intrinsic motivation. Teachers in this profile almost exclusively learn because they find it important and enjoyable. Therefore, teachers in this profile are designated ‘extremely autonomous’. In the second profile, identified regulation and intrinsic motivation are medium–high, whereas external and introjected regulation are medium–low. Teachers in this profile are labelled ‘moderately motivated’. In the third profile, identified regulation and intrinsic motivation are high, external regulation is low, and introjected regulation is medium. This profile is labelled ‘highly autonomous’. Finally, the fourth profile is characterized by medium–low to low means of all motivational dimensions. Notably, in this profile external regulation is relatively high, which means teachers in this profile are
mostly engaged in professional learning because of reasons that lie outside themselves. This profile is designated ‘externally regulated’.

3.3. Relations between profile membership and basic need satisfaction and engagement in learning

Fit indices and difference-tests of the model without covariates and the models to which covariates are added sequentially are presented in Table 6. All models with covariates are an improvement in relation to the LPA model without covariates. Adding autonomy, relatedness, and their interaction significantly improves the model. Adding competence, however, does not cause a significant improvement of fit. Therefore, in the final model that will be analysed only autonomy, relatedness, and their interaction are included as covariates. The profile solution of this final model is presented in Fig. 3b. This figure illustrates that 17% of the teachers are classified into the extremely autonomous profile, 48% into the moderately motivated profile, 22% into the highly autonomous profile, and 13% into the externally regulated profile. The configuration of motivational dimensions hardly changes as a consequence of adding the covariates to the model. Therefore, we do not need to consider basic psychological needs as auxiliary variables.

Table 7 shows the results of the multinomial logistic regression of the four profiles on autonomy, relatedness, and the interaction between them. We selected the ‘externally regulated’ profile as the reference category, since it was considered interesting to see the contrasts between that and the other profiles. When contrasting the probability of teachers being classified into ‘externally regulated’ versus the other profiles, autonomy satisfaction is a significant positive predictor for all contrasts. Relatedness is a significant positive predictor for teachers belonging to the ‘moderately motivated’ and ‘high autonomous’ profiles. The interaction between autonomy and relatedness is a marginally significant negative predictor for these profiles. This shows that the extent to which teachers perceive their basic needs satisfied is related to having a certain motivational profile.

Table 8 displays the means of TPL activity engagement, and background variables for the different profiles. Since the sample size in this study causes most differences to be significant, only nonsignificant mean differences are indicated. In general, the results show that the ‘extremely autonomous’ profile is most engaged in all TPL activities, followed by teachers from the ‘highly autonomous’ profile, then the ‘moderately motivated’ teachers, and finally, the ‘externally regulated’ teachers.

4. Discussion

This study investigated what distinct profiles of motivational dimensions Dutch secondary school teachers have in relation to TPL. To this end, a latent profile analysis was performed on the data and four profiles were distinguished. These profiles were labelled ‘extremely autonomous’, ‘moderately motivated’, ‘highly autonomous’, and ‘externally regulated’.

Teachers having the extremely autonomous motivational profile are characterized by very high intrinsic motivation and identified regulation relative to their introjected and external regulation. As such, these teachers engage in professional learning first and foremost because they find it enjoyable, interesting, value it personally, and see it as important to their goals. Theoretically, this combination of motivational dimensions is highly desirable in teachers because their intrinsic motivation ensures active and constant engagement in short-term, fun, and interesting TPL activities. At the same time, because of their identified regulation, these teachers will sustain engagement in TPL activities that are not necessarily enjoyable (Koestner & Losier, 2002). The foregoing also holds for teachers who have the highly autonomous profile, although the positive effects of this profile will be somewhat less

### Table 5

<table>
<thead>
<tr>
<th>Profile</th>
<th>Motivational dimension</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely autonomous</td>
<td>External regulation</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Introjected regulation</td>
<td>1.23</td>
</tr>
<tr>
<td></td>
<td>Identified regulation</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>Intrinsic motivation</td>
<td>0.01</td>
</tr>
<tr>
<td>Moderately motivated</td>
<td>External regulation</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Introjected regulation</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Identified regulation</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Intrinsic motivation</td>
<td>0.30</td>
</tr>
<tr>
<td>Highly autonomous</td>
<td>External regulation</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>Introjected regulation</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>Identified regulation</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Intrinsic motivation</td>
<td>0.19</td>
</tr>
<tr>
<td>Externally regulated</td>
<td>External regulation</td>
<td>1.73</td>
</tr>
<tr>
<td></td>
<td>Introjected regulation</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>Identified regulation</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Intrinsic motivation</td>
<td>0.24</td>
</tr>
</tbody>
</table>

### Table 6

<table>
<thead>
<tr>
<th></th>
<th>−2 log likelihood</th>
<th>AIC</th>
<th>BIC</th>
<th>SBIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No covariates</td>
<td>17,593.51</td>
<td>17,673.51</td>
<td>17,901.09</td>
<td>17,774.00</td>
</tr>
<tr>
<td>Aut</td>
<td>16,186.22</td>
<td>16,272.22</td>
<td>16,515.58</td>
<td>16,378.97</td>
</tr>
<tr>
<td>Aut + rel</td>
<td>15,598.50</td>
<td>15,690.50</td>
<td>15,949.17</td>
<td>15,803.02</td>
</tr>
<tr>
<td>Aut + rel + aut × rel</td>
<td>15,519.03</td>
<td>15,617.03</td>
<td>15,892.55</td>
<td>15,756.87</td>
</tr>
<tr>
<td>Aut + rel + aut × rel + com</td>
<td>15,515.74</td>
<td>15,619.74</td>
<td>15,912.12</td>
<td>15,746.91</td>
</tr>
</tbody>
</table>

Note. −2 log likelihood values showing superscripts indicate that the more complicated model is a significant improvement of fit compared to the model preceding it (p < .001). For all χ²-difference tests df = 3.
prominent. At first glance, the extremely autonomous and highly autonomous profiles seem similar to each other. However, inspection of the basic needs that predict profile membership indicates that the models do differ. For the extremely autonomous profile only autonomy satisfaction is related to membership, whereas for the highly autonomous profile both autonomy and relatedness are predictive. This is in line with the assumption of SDT that high intrinsic motivation results from high basic needs that predict profile membership. As expected, high perceived autonomy increased the odds of being classified into a profile with high(er) manifestations of intrinsic motivation and identified regulation compared to the externally regulated profile. High perceived relatedness only increased the odds of being classified into the moderately motivated and highly autonomous profile. No significant change in odds of being classified into the extremely autonomous profile resulted from an increase in relatedness. This may be explained by the fact that, in the extremely autonomous motivational profile, intrinsic motivation is very prominent and relatedness is only a distant determinant of intrinsic motivation (Koesnifer & Losier, 2002; Ryan & Deci, 2006).

The moderately motivated teachers, who comprise 48% of the sample, have medium–high intrinsic motivation and identified regulation, and medium–low introjected and external regulation. These teachers are not as motivated for TPL as their colleagues having the extremely autonomous and highly autonomous pro-

Table 7
Multinomial logistic regression analysis of profile membership as a function of basic psychological need satisfaction.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Wald-test</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>'Extremely autonomous'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>−14.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>3.63</td>
<td>2.580***</td>
<td>37.56</td>
</tr>
<tr>
<td>Relatedness</td>
<td>−0.41</td>
<td>−0.396</td>
<td>0.66</td>
</tr>
<tr>
<td>Autonomy × Relatedness</td>
<td>0.19</td>
<td>0.578</td>
<td>1.21</td>
</tr>
<tr>
<td>'Moderately motivated'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>−12.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>3.72</td>
<td>3.000**</td>
<td>41.26</td>
</tr>
<tr>
<td>Relatedness</td>
<td>2.26</td>
<td>2.363</td>
<td>9.58</td>
</tr>
<tr>
<td>Autonomy × Relatedness</td>
<td>−0.56</td>
<td>−1.713†</td>
<td>0.57</td>
</tr>
<tr>
<td>'Highly autonomous'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>−24.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>6.62</td>
<td>5.33***</td>
<td>749.95</td>
</tr>
<tr>
<td>Relatedness</td>
<td>2.58</td>
<td>2.38*</td>
<td>16.19</td>
</tr>
<tr>
<td>Autonomy × Relatedness</td>
<td>−0.63</td>
<td>−1.91†</td>
<td>0.53</td>
</tr>
</tbody>
</table>

† p < .001. * p < .05. ** p < .01. *** p < .001.

Based on this study's results, strategies to improve the externally regulated teachers' motivation towards a more favourable profile should include enhancing the basic need satisfaction of teachers in this group. Autonomy, relatedness and their interaction proved to be predictive for teachers' profile membership. As expected, high perceived autonomy increased the odds of being classified into a profile with high(er) manifestations of intrinsic motivation and identified regulation compared to the externally regulated profile. High perceived relatedness only increased the odds of being classified into the moderately motivated and highly autonomous profile. No significant change in odds of being classified into the extremely autonomous profile resulted from an increase in relatedness. This may be explained by the fact that, in the extremely autonomous motivational profile, intrinsic motivation is very prominent and relatedness is only a distant determinant of intrinsic motivation (Gorozidis & Papaioannou, 2014). Feelings of autonomy can be enhanced by allowing flexibility in teachers' daily timetables, for example by having a system for substitute teachers. This gives teachers the freedom to choose when to undertake TPL activities such as visiting other teachers' lessons. In addition, teachers need to be given the opportunity to arrange the TPL activities they undertake according to their own needs and goals. This freedom of choice will not only enhance feelings of autonomy, but possibly satisfies the need for competence as well. That is, showing faith in teachers to take responsibility for their own learning may serve as positive feedback to them, and positive feedback has been shown to contribute to feelings of competence (Ryan & Deci, 2002; Vallerand & Reid, 1984). This is in line with the recent finding that autonomy and competence are synergistic in their relationship with intrinsic motivation (Dysvik, Kuvaas, & Gagné, 2013). Feelings of relatedness among teachers could be enhanced by creating school environments that allow physical proximity and many opportunities for informal social encounters. A lack of physical proximity to colleagues work areas has been found to inhibit teachers' motivation for informal learning (Loehman, 2006). Factors contributing to physical proximity of teachers and opportunities for social encounters are, again, smart time-tabling, but also creating meeting spaces for teachers that are in the same departments (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). The environmental changes proposed here all refer to conditions of the broader concept of school culture (i.e., the operation of administrative and organizational structures). School culture already has been shown to influence teachers' engagement in (informal) teacher professional learning (Avalos, 2011).

The finding that perceived competence did not significantly add to the prediction of having a certain motivational profile was not anticipated beforehand. The importance of autonomy for all dimensions of motivation, and the importance of relatedness for the extrinsic motivations, led to the expectation that these basic needs would be the most influential predictors of profile membership. However, considering the fact that in one of the motivational profiles identified intrinsic motivation was extremely high, finding no effect on competence satisfaction was surprising. Furthermore, this finding is not in line with previous highly unfavourable. 13% of the teachers in our sample could be classified into the externally regulated profile. This indicates that a considerable group of teachers has a non-optimal motivation for TPL, both in strength and quality.

The respective favourable and unfavourable nature of the motivational profiles is also shown in the results regarding the TPL engagement of teachers in different profiles. Teachers having the extremely autonomous, highly autonomous, and moderately motivated profile consistently report higher engagement in TPL than the externally regulated profile. In more absolute terms teachers in the latter profile score considerably lower than the scale–midpoint of 2.5 across the range of learning activities. As such, an effort towards motivating these teachers for TPL is recommended.

Table 8
Means of TPL engagement and background variables within different profiles.

<table>
<thead>
<tr>
<th></th>
<th>Extremely autonomous</th>
<th>Moderately motivated</th>
<th>Highly autonomous</th>
<th>Externally regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>3.07</td>
<td>2.64</td>
<td>2.80</td>
<td>2.23</td>
</tr>
<tr>
<td>Work related training</td>
<td>2.28</td>
<td>2.02</td>
<td>2.12</td>
<td>1.67</td>
</tr>
<tr>
<td>Experimenting</td>
<td>2.61</td>
<td>2.30</td>
<td>2.42</td>
<td>1.96</td>
</tr>
<tr>
<td>Reflecting</td>
<td>2.62</td>
<td>2.34</td>
<td>2.43</td>
<td>2.10</td>
</tr>
<tr>
<td>Collaborating: lesson</td>
<td>2.60</td>
<td>2.33*</td>
<td>2.39*</td>
<td>2.10</td>
</tr>
<tr>
<td>Collaborating: school</td>
<td>2.88</td>
<td>2.57*</td>
<td>2.65*</td>
<td>2.23</td>
</tr>
<tr>
<td>Age</td>
<td>49.55 c</td>
<td>48.74 c</td>
<td>49.45 c</td>
<td>51.79</td>
</tr>
<tr>
<td>Gender</td>
<td>1.55</td>
<td>1.40</td>
<td>1.47</td>
<td>1.32</td>
</tr>
<tr>
<td>(1 = male)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lessons taught per week</td>
<td>16.13*</td>
<td>17.57</td>
<td>16.74*</td>
<td>18.48</td>
</tr>
</tbody>
</table>

Note: TPL = teacher professional learning. Means sharing superscripts do not differ significantly. All other mean differences are significant at p < .05.
research relating motivational profiles to basic need satisfaction (Moran et al., 2012). This research found a difference in competence satisfaction between profiles high and low in autonomous motivation. However, in the study by Moran et al. (2012), the influence of the three basic needs on profile membership was not investigated simultaneously in one model. A possible explanation for the current results, therefore, is that there is no unique variance in profile membership left to be explained by competence satisfaction because of its correlation with both autonomy and relatedness (Dysvik et al., 2013). It might also mean that for domains as broad as TPL, competence satisfaction is less important for teachers’ full spectrum of motivation. This is not to say that for very specific TPL behaviour that is initiated and sustained by only one type of motivation (e.g., intrinsic motivation) competence is not important either. Further (qualitative) research is needed to investigate the effects of interrelations of basic needs on profiles of SDT dimensions.

4.1. Limitations

Other issues that demand further investigation result from the limitations of this study. First of all, an even more detailed picture of the nature of teachers’ motivation for TPL would be achieved if measures of motivation were taken for all separate TPL activities. Although a strength of the current research is that motivation for TPL as a whole is investigated, it would be interesting to compare teachers’ motivation for the different specific TPL activities within one sample. Practical constraints, however, limited this study to measure motivation for TPL in a more global way.

A second limitation of this study is the response rate of 10.03%. Because of this, we have to be tentative in concluding that this study’s sample is representative of the population in terms of motivation for TPL. To shed some light on this issue, we investigated the relations between motivational dimensions for TPL and willingness to participate in future studies. Results show that it is likely that our sample contains an overrepresentation of teachers who have a favourable motivational profile for TPL. This could mean that the actual proportion of teachers that have an unfavourable motivational profile for TPL in the population may be even larger than the 13% we found in this study. If this is the case, the practical implications for schools discussed above become even more important.

Finally, since the data in this study is correlational, making causal inferences between relations is not justified. Theory strongly specifies a causal relationship between basic need satisfaction and motivation, and such a relationship has also been shown in experimental research (Ryan & Deci, 2002). However, it cannot be unequivocally concluded from the current study that teachers’ engagement in TPL follows from having a certain motivational profile. Further research taking an experimental approach is needed to justify such a conclusion.

4.2. Concluding remarks

Notwithstanding the limitations mentioned above, this study has shown that teachers experience multiple dimensions of motivation for engaging in professional learning activities. Many teachers have a relatively favourable motivational profile. However, for a substantial proportion of teachers in the current sample, the specific combination of motivational dimensions is non-optimal. This becomes especially apparent when engagement in TPL activities is compared across motivation profiles. Furthermore, having a specific motivational profile is related to teachers’ basic psychological need satisfaction. Based on previous research demonstrating a causal relationship between basic need satisfaction and motivation, this calls for interventions that will make school environments more supportive of teachers’ basic psychological needs.

References


