Factors affecting teachers' participation in professional learning activities

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Abstract

This paper describes two studies into teacher workplace learning. The first study aimed at developing a definition of teacher learning at the workplace and at exploring factors that may affect teacher learning at the workplace. Based on a conceptualization of teacher workplace learning as participation in professional learning activities, the second study addressed two research questions to be answered by means of a survey: 1) To what extent do teachers participate in professional learning activities? and 2) What factors affect this participation? Results reveal great discrepancies between theory and practice in opportunities for professional learning at the workplace.
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1. Introduction

In the Netherlands, a large-scale educational reform is currently being implemented in secondary education. This reform aims at a major change in the secondary school curriculum, and is also described as 'teaching and learning for understanding' (Hargreaves & Fink, 2000; McLaughlin, 1997). To this end, new subjects addressing social and technical competencies are incorporated into the curriculum in addition to traditional subject matter knowledge. Next, the development of higher-order thinking skills has been explicitly defined as an educational goal for students. The

background for this curriculum renewal is a growing need in modern society for people who are ready for lifelong learning and who know how to learn. Secondary schools have to bear their own responsibilities in this respect and are expected to prepare adolescents in acquiring basic competencies for lifelong learning. The interest in these learning competencies is closely linked to new theoretical insights in which learning is conceived as an active, constructive, collaborative, and context-bound activity. "Current theory holds that students learn best when they have the opportunity to actively construct their own knowledge" (McLaughlin, 1997, p. 79).

It is widely acknowledged that promoting this kind of student learning requires teachers to adopt a new pedagogical approach (Bransford, Brown, & Cocking, 1999; King & Newmann, 2000;

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McLaughlin, 1997; Putnam & Borko, 2000). In order for students to construct their own knowledge, teachers can no longer adhere to their traditional role of transmitting knowledge. Instead teachers have to fulfil a new role by creating stimulating learning environments and by acting as facilitators in students' learning processes. How are teachers prepared for this new role? Traditionally, teachers attend courses, training, or conferences and read professional journals to refresh and update their knowledge and skills. Nevertheless, the sufficiency of these traditional professional development activities has been debated recently (Darling-Hammond, 1998; Lieberman, 1996; Moore & Shaw, 2000; Wilson & Berne, 1999). As Bransford et al. state, "Much of what constitutes the typical approaches to formal teacher professional development are antithetical to what research findings indicate as promoting effective learning" (1999, p. 192).

Although there is much agreement about the limitations of this traditional professional development approach, there is less agreement about the way teacher learning has to be organized otherwise. Opinions and solutions regarding alternative ways to support teacher learning seem to depend on the kind of theoretical perspective taken. In the literature two different theoretical perspectives are prevalent that help to understand different approaches to teacher learning: the cognitive psychological perspective and the professional development perspective. In the following section these two perspectives will be described and analyzed in order to develop a rationale to direct further study into alternative professional development approaches.

1.1. Perspectives on teacher learning

From a cognitive psychological perspective, this new view on learning does not only apply to student learning, but to teacher learning as well (Borko & Putnam, 1996; Bransford et al., 1999; Candy, 1991; Putnam & Borko, 2000). As a result of this new view on learning, practicing teachers themselves have to learn new ways of teaching. But if teachers are assumed to learn in the same way that students do, teachers also have to construct

their own knowledge and direct their own learning. As this active and constructive learning is "heavily influenced by an individual's existing knowledge and beliefs and is situated in particular contexts" (Borko & Putnam, 1996, p. 674), a change in teaching practice always affects preexisting knowledge and beliefs as new knowledge and beliefs about teaching, learning, learners, and subject-matter have to be acquired. Consequently, teachers must be supported to acquire this new knowledge and beliefs, whereas specific attention has to be paid to support for changing their existing knowledge and beliefs in different domains. From this perspective teacher learning does not take place by transmission of knowledge only, as learning has to be facilitated by creating favorable learning environments in which teachers take charge of their own learning (Bransford et al., 1999; Putnam & Borko, 2000). Although the aim of learning is ultimately a change in classroom practice, learning does not only have to be situated in this setting, as powerful learning experiences are gained outside the classroom as well. As Putnam and Borko state, "the most appropriate staff development site depends on the specific goals for teachers' learning" (2000, p. 7). Putnam and Borko strongly recommend situating teacher learning in multiple learning settings (in and out of classrooms) in which teacher educators play an important role.

From a professional development perspective, traditional professional development activities fall short of helping teachers learn how to teach for understanding. Just as in the cognitive psychological perspective, it is stressed that teachers' learning does not primarily address fact-based knowledge, but that teachers have to learn new conceptions of content and pedagogy, and have to take on new roles (McLaughlin, 1997). As these kinds of changes in roles are at stake, traditional ways of learning characterized by transmission of knowledge are bound to miss the mark. Instead, teachers have to acquire competencies that help them fulfil this new role. The working context is proposed as the most suitable place in this respect, as new teaching competencies can only be acquired in practice (Hargreaves, 1997; Moore & Shaw, 2000; Retallick, 1999; Scribner, 1999). However,

the view on what constitutes a working context differs within this perspective. Some authors consider the working context as primarily related to the daily job of teaching, so largely taking place within classrooms and schools. Other authors take a broader view on the working context that, next to classrooms and schools, also includes various types of communities such as cross-school professional communities, networks, and school–university partnerships (National Commission on Teaching & America's Future, 1996; National Staff Development Council, 2000).

So, both perspectives acknowledge that current reform calls for a debate about new professional development approaches, and both stress the situated nature of knowledge and learning.

Although both perspectives advocate that teachers' learning experiences have to be situated in and out of classrooms, the two perspectives differ not only with regard to the role of staff developers in learning settings outside classrooms but also with respect to arguments for situating learning outside the classroom. In the professional development perspective teachers themselves are key actors in directing and arranging their own learning processes, whereas the cognitive psychological perspective attributes an important role to staff developers in this respect. Besides, the professional development perspective favors professional communities as learning settings as a significant source for learning in addition to the learning taking place at the workplace, whereas the cognitive psychological perspective favors learning settings outside classrooms because the workplace is not considered to be as appropriate to reach all learning goals.

Both perspectives value the strengths of the workplace as is demonstrated by the expression that schools have to develop into places for teachers to learn (Borko & Putnam, 1996; Hargreaves, 1994; Smylie, 1995). However, as schools are expected to provide a large range of learning opportunities for their teachers, it is also remarked that most schools fall short in this respect (Bransford et al., 1999; Fullan 1993; Hargreaves, 1997; Leithwood, Jantzi, & Steinbach, 1998; Moore & Shaw, 2000; Putnam & Borko, 2000). Combining this remark with the limitations that

the cognitive psychological perspective attributes to the workplace as a setting for learning, it was concluded that studying learning at the workplace would be a worthwhile endeavor to shed some light on the question whether schools really are places for teachers to learn. Restricting our study to learning at the workplace also implies that we focus on learning that is primarily situated in classrooms and schools and that we exclude learning within professional communities that require contacts with people outside the school.

In order to investigate learning at the workplace empirically, two studies have been carried out. The first study consisted of a theoretical review and an empirical inquiry into the way teachers learn within their workplace, as well as a review of factors that promote or inhibit teachers' workplace learning. The study was set up to develop a definition of teacher learning at the workplace and to build an empirical model for explaining teacher learning at the workplace. The second study was a survey investigation, springing from the results of the first study.

1.2. Teacher learning at the workplace: participating in professional learning activities

An answer to the question: "In what ways do teachers learn within their workplace?" was obtained from a literature review as well as from empirical investigation. In the literature review we started from the assertion that cognition is situated in nature. From that we searched for adult and professional learning principles within the fields of school improvement and organizational learning theories (Lieberman, 1996; Moore & Shaw, 2000). So, three theoretical learning principles were unfolded that were taken as constituting elements of a definition of teacher learning at the workplace. Next, a qualitative investigation was carried out to reveal existing viewpoints of teachers themselves on their ways of learning at the workplace in order to validate the theoretical assumptions. The design and results of this study will be described after the presentation of results from the theoretical review.

The idea that cognition is situated in nature was taken as a starting point as this idea is prevalent in

cognitive psychological and professional development perspectives on teacher learning. Theorists who consider cognition as situated assume learning and knowing to be integrally and inherently situated in the everyday world of human activity (Candy, 1991; Darling-Hammond, 1998; McLaughlin, 1997; Putnam & Borko, 2000; Scribner, 1999). Thus, learning and participation in activities are integrated, as activity is "an integral part of the learning that takes place within it" (Putnam & Borko, 2000, p. 4) on the one hand, whereas teacher learning is regarded to be centered around critical activities of teaching and learning on the other hand (Darling-Hammond, 1998). As teachers' learning is embedded in everyday activities (McLaughlin, 1997) teacher learning at the workplace is consequently taking place by teachers' participation in activities within the school context. This idea of learning as participation in activities is a first learning principle that is present in school improvement and organizational development theory also. Both domains stress the integration of work and learning processes as a necessary condition for improvement and development at an individual as well as at an organizational level (Hargreaves, 1997; King & Newmann, 2000; Livneh & Livneh, 1999; Marsick & Watkins, 1999; Moore & Shaw, 2000; Scribner, 1999; Wenger & Snyder, 2000).

A second learning principle stems from the recognition that learning is not only individual but also social in nature (Jarvis, 1997). The notion of individual learning is prevalent in the concept of self-directed learning (Caffarella, 1993; Candy, 1991; Clardy, 2000; Houle, 1980). However, individual learning may not be equated with self-direction as self-directed learning has very different meanings which are heavily debated within the context of critical adult education theory (Brookfield, 1993; Candy, 1989, 1991). Although the political questions raised in this debate appear as significant in the field of adult education, we do not intend to open this debate here. We do take from this debate that learning is culturally bound and thus strongly related to the context in which it takes place which logically implies that it is also collaborative in nature. However, the individual level of learning may not be neglected in introducing the collaborative level of learning as research into self-directed adult learning has shown that adults undertake many learning projects out of their own initiatives and bear individual responsibility for planning, executing and evaluating their own learning activities (Candy, 1991; Merriam & Caffarella, 1991).

The notion of individual and collaborative learning is also widely addressed in professional development approaches in which both levels play a significant role. However, there is a growing call for more collaboration in order to stimulate teacher learning (Hargreaves, 1997; King & Newmann, 2000; Jenlink & Kinnucan-Welsch, 2000; Lieberman, 1996; Little, 1993; McLaughlin, 1997; Moore & Shaw, 2000; Rosenholtz, 1989; Southworth, 1994). The reasoning behind this call for collaboration is that feedback, new information or ideas do not only spring from individual learning, but to a large extent also from dialogue and interaction with other people. Moreover, collaboration is assumed to create a learning culture and helps to build a community in which further learning is supported and stimulated.

The third learning principle refers to the aim attached to teacher learning: learning is regarded as necessary for teachers to develop professionally. As professional development can be described as "The process by which teachers acquire the new knowledge, skills, and values which will improve the service they provide to clients" (Hoyle & John, 1995, p. 17) teachers' learning is strongly connected to professional goals which demand teachers to strive for continuous improvement of their teaching practices. From this principle, teacher learning is rather referred to as professional learning. Moreover, adhering professional aims to learning strongly influences the preferred and proposed means that may lead to these goals. There is much agreement within the literature about these means, that is to say about how teachers have to learn in order to develop professionally. All ways of professional learning can be sorted into four categories: three categories regarding the individual level of learning, and one category referring to the collaborative level of learning. A first category frequently mentioned has to do with *reading* in order to collect new

knowledge and information or data (Darling-Hammond, 1998; King & Newmann, 2000; McLaughlin, 1997; Moore & Shaw, 2000; Scribner, 1999). Keeping up is a core responsibility of professionals, as the professional knowledge base underlying professional work does rely on the input of new information since it is subject to continuous improvement. Main aim of reading is keeping up to date with new insights and developments influencing the professional field such as new subject matter, new teaching methods and manuals, new pedagogical approaches, but also new societal developments which have an impact on education and teaching in general. A second category is referred to as doing (Darling-Hammond, 1998; McLaughlin, 1997; Moore & Shaw, 2000) as well as experimenting (Bransford et al., 1999; Houle, 1980; King & Newmann, 2000; Moore & Shaw, 2000). By doing and experimenting teachers not only gain new experiences but apply new ideas as well, so they really put effort in improving their own professional practices within the classroom as is most significant from a professional point of view. However, it is debated whether 'doing' in itself may be linked to learning, as doing also addresses routine behavior (Jarvis, 1987). So, it is suggested that *experimenting* as an intentional effort of teachers to try something new within the classroom is most appropriate in this respect. A third category that is remarkably often referred to is *reflection* (King & Newmann, 2000; McLaughlin, 1997; Moore & Shaw, 2000; Retallick, 1999). Reflection is viewed as the cornerstone of professional development as it is prerequisite to recognize and change routine behavior (Schön, 1983). Unlearning routines is a first step in changing practices, and thus in improving the quality of teaching and education (Eraut, 1995; Hoyle & John, 1995). Although it is stressed that the object of this reflection is to address teachers' own way of teaching, the act of reflection is regarded as connected to the availability of feedback that may spring from different sources within the work environment. The fourth category addresses *collaboration*, also referred to as the collaborative level of learning. Collaboration is most important to professional development as it not only provides necessary support for learning

but also provides teachers with feedback and brings about new ideas and challenges. However, collaboration may take very different forms that do not automatically lead to learning (Hargreaves, 1994). Little (1990) convincingly argued that the content of collegial interaction is most important in considering the contribution of collaboration to teachers' professional development. The content, what the interaction is about, differs according to the extent to which teachers depend on each other within this interaction. Thus, Little distinguishes four types of collegiality that vary in this respect and that refer to collaboration of teachers within their own schools: story-telling, help, sharing, and joint work. In 'joint work' teachers are most dependent on each other whereas 'storytelling' demands almost no mutual interdependence and takes place informally.

In conclusion, these three learning principles help us to come up with a definition of learning at the workplace. Combining the first two principles will lead us to conclude that learning at the workplace may be conceptualized as participation in activities at an individual and at a collaborative level. The third learning principle helps to further restrict the range of individual and collaborative activities that teachers may participate in by stressing that those activities have to help teachers in their professional development. It urges us to refine activities into professional learning activities. So, learning at the workplace is conceptualized as participation in professional learning activities, which can be divided into individual activities addressing the categories of reading, experimenting, and reflecting and into collaborative activities taking place within the school.

Although the definition is applicable to our research goals we have two remarks concerning this definition. At first, we may conclude that the meaning of 'workplace' is confusing as it does not only refer to the concrete spot where learning takes place but also to the connection of learning to the daily work of teaching. We adopted the idea that learning taking place at the workplace is situated in classrooms and schools and so, we excluded collaborative learning with people outside the school. Actually, our final definition includes individual activities that can be undertaken outside

the school as well, like reading and reflecting although both categories of professional learning activities may also take place inside schools. This means eventually that the activity itself is considered more important than the situation in which it takes place. Although this is in accordance with our own starting points we question whether our arguments to exclude collaborative activities outside the school proved valid in this respect. We think that collaborative activities in which teachers participate outside the school need to be addressed in future research especially in connection to teachers' daily work. Nevertheless, in this research we did not include those activities considering the need for limiting our research domain. Secondly, although we argued that learning and participation in activities are conceptually related, it has to be acknowledged that participation in professional learning activities is not synonymous with the learning that arises from this participation. Nevertheless, the choice to conceptualize learning as the latter was made deliberately, as participation in activities was considered prerequisite for learning to occur. Moreover, we argue that participation in professional learning activities has to be investigated first before examining the learning results and processes that go along with this participation.

In addition to this theoretical answer, a qualitative study has been carried out to get insight into the perspective of teachers themselves on how they learn at their workplace (Kwakman, 1999). The choice to include teachers' voices was made deliberately to verify the adequacy of the theoretical definition of teacher learning at the workplace at first. Secondly, we wanted to explore the specific professional learning activities in which teachers participate in practice to further operationalize the variable 'participation in professional learning activities' for the survey study to be conducted in the second phase of the research project. Therefore, data gathering took place using an inductive approach (in which teachers were invited to talk freely about their own learning) to increase the chance of getting to know how learning takes place empirically. However, data were analyzed according to the theoretical categories of teacher learning at the workplace in order to develop an empirical inventory of professional learning activities.

Sixteen secondary school teachers participated in the study. The sample consisted of 7 teachers in history, 5 in mathematics, and 4 in Dutch language. Their years of teaching experience ranged from 6 to 33 years. Five women and 11 men were involved, all of them were teaching in upper secondary classes. All interviews lasted at least 50 min, were tape-recorded and transcribed.

So, open interviews were conducted in which the following topics were addressed:

- recent developments influencing teaching practice;
- keeping up with the job and with new developments;
- learning from teaching;
- challenging situations;
- personal and professional development during their career;
- participation in and appraisal of extra curricular activities;
- collaboration with colleagues.

Analysis of the data took place in two phases. First, all fragments referring to learning were selected. Next, these fragments were coded and categorized into professional learning activities using the constant comparison method (Strauss & Corbin, 1990). For coding and categorizing collaborative activities, the four types of collegiality developed by Little (1990) were used. So, analysis of fragments referring to collaboration was narrowed towards the content of collegial interactions. This procedure identified 32 different learning activities. Secondly, all those activities were categorized within the four categories of reading, experimenting, reflecting, and collaborating. Results are shown in Table 1.

Little's collegiality types were helpful in structuring various collaborative activities, as these appeared to form the largest category. Although 6 of the 32 learning activities could not be placed into the four categories derived from theory, all four categories contain relevant professional learning activities in which teachers participated during their daily work. As the majority of activities fit into the four predefined categories, it was concluded that the definition of teacher learning at the workplace proved helpful in structuring

Table 1
Professional learning activities categorized

Categories	Professional learning activities
Reading	Studying subject matter literature
	Reading professional journals
	Studying teaching manuals
	Reading newspapers
Experimenting	Helping students learning study skills
	Preparing lessons individually
	Experiment with new teaching methods
	Constructing lesson materials
	Constructing tests
	Working with new method
Reflecting	Supervising student teachers
	Receiving coaching of guidance
	Coaching colleagues
	Receiving pupils' feedback
Collaborating	(a) Storytelling
	(b) Help:
	Asking for help
	Giving help
	(c) Sharing
	Materials
	Ideas about innovation
	Instructional issues
	Ideas about pupil counseling
	Ideas about education
	(d) Joint work
	Coordination
	Joining committees
	Preparing lessons
	Implementing innovations
Not fitting into categories	Counseling pupils
	Executing non-curricular tasks
	Performing management tasks
	Organizing extracurricular activities for pupils
	Classroom interaction with pupils
	Teaching in itself

professional learning activities, and that the notion of professional learning activities serves as a useful analytical tool.

However, activities as they arise in practice also give cause for questioning the adequacy of the four theoretical categories and the proposed definition of learning at the workplace. Activities that do not fit into any of the four categories suggest the existence of other types of activities as well such as participation in non-curricular and non-routine tasks, but also to sources of learning that arise from teaching and pupil interaction in itself. So, it has to be acknowledged that participation in professional learning activities takes place beyond the four categories as perceived by teachers themselves.

1.3. Factors affecting teachers' professional learning activity

The second part of the first study explored factors promoting or inhibiting teachers' workplace learning in order to construct an empirical model for teacher learning. As most salient factors that influence teachers' participation in professional learning activities are still unclear, we started from a basic model about learning at the workplace with the sole assumption that learning is influenced by personal as well as by contextual factors (Clardy, 2000; Retallick, 1999; Scribner, 1999). To further refine factors within this general model, we searched for theories that fit our conceptualization of teacher learning as participation in professional learning activities. So, we used adult learning theory and social psychological theory of work stress. The choice of adult learning theory seems inherent to our emphasis on participation in learning activities as this is a familiar research topic within this domain. Although the use of work stress theory may be surprising, this choice was inspired by the fact that this theory conceptualizes learning as active usage of learning opportunities within the working environment. Moreover, stress theory provides a challenging perspective on teacher development as it proposes a model in which stress and learning are conceptually related.

Both theories helped to discern relevant factors. Concerning personal factors, five factors were discerned. With regard to contextual factors, it appeared that these had to be split into two different categories: task factors and work environment factors. Within these subcategories, five task factors and three work environment factors were discerned.

The first three personal factors derive from adult learning theory. Within this domain, the influence of individual characteristics in generating

self-directed learning has been examined extensively with the intent to reveal learner characteristics of successful learners (Caffarella, 1993). Although the importance of motivation is stressed in the literature (Clardy, 2000; Eraut, Alderton, Cole, & Senker, 1998; Farr & Middlebrooks, 1990; Scribner, 1999), results about the kinds of characteristics that affect self-directed learning are confusing and even contradictory (Merriam & Caffarella, 1991). A first possible explanation for these disappointing results is a lack of effective instrumentation and theory (Clardy, 2000). In each investigation, a lot of different characteristics are related to self-directed learning addressing a mixture of motivational aspects such as attitudes, skills, styles, personality characteristics, as well as preferences (Candy, 1991). A second possible explanation for this lack of clarity is offered by Candy (1989, 1991) who states that the origin of self-directed learning is "less a function of individual character or personality differences and more a function of the contextual factors in which people find themselves. That is, self-directed learning is more influenced by more situational factors, leaving individual difference factors with less explanatory value" (Clardy, 2000, p. 108). According to Candy, self-directed learning can not be explained by a context-free personal characteristic such as self-directedness, as "people's willingness to participate in self-directed learning activities is shaped (…) by their construction of the particular situation and circumstances" (Candy, 1991, p. 155). Starting from a constructivist view on knowledge and learning, Candy argues that personal understandings and attitudes of individual learners are most important to address, but only if they are considered to be situation-specific and context bound. As motives and interests are also "shaped and modified through interaction with other people" (p. 199), activities will not be entirely self-directed as the environment in which they take place is directing learning to a certain degree as well. Hence, it was decided to select three factors that may capture Candy's main ideas of personal meaning as well as interactivity with the environment: professional attitudes and appraisals of professional learning activities. The first factor *professional attitudes* refers to the

meaning that is attached to the new professional role teachers ought to fulfil now-a-days and the responsibilities that go along with this role. The second and third factors concern appraisals that are crucial in the process of meaning-making as judgements mirror how personal and situational characteristics interact (Boekaerts, 1996). As meaning is situation-specific in nature, appraisals elicit the meaning teachers attach to different professional learning activities by making judgements about different features of each professional learning activity separately. Features considered as most significant to teachers are the extent to which activities are appraised as feasible and meaningful, which implies that both features are regarded as separate factors within the model. So, *appraisals of feasibility* and *appraisals of meaningfulness* of separate professional learning activities are included as second and third factors within the model.

The fourth and fifth personal factors spring from work stress theory in which it is assumed that stress and learning are mutually related, such that stress affects the participation in professional learning activities (Karasek & Theorell, 1990; Leithwood et al., 1999). This relationship between stress and participation in learning activities remains conceptual rather than empirical due to the fact that work stress research is predominantly directed at explaining stress, not at explaining learning. There is some evidence that this relationship is much more complex than the Karasek model assumes (Kwakman, 2001). However, as the Karasek model represents the dominant perspective in the occupational stress area due to a clear underlying conceptual reasoning (Kwakman, 2001) and as learning plays a vital role within this model, stress was viewed as an important personal variable to include in the research model. As it was recognized that stress is also a complex concept that is defined in many different ways, we decided to rely on the way stress is defined and measured by Dutch researchers within the area of teacher stress research (Van Horn, Caljé, Schreurs, & Schaufeli, 1997). Findings indicate that two factors appear as most reliable in this domain: *emotional exhaustion* and *loss of personal accomplishment* (Schaufeli, Daamen, & van Mierlo,

1994). Therefore, those two factors have been included in the model.

Five task factors were derived from the social psychological model of work stress that is also known as the job demand control model (Karasek & Theorell, 1990). This model proposes that stress as well as learning result from the joint effects of job demands and the discretion permitted to the worker in how to meet these demands (job control). Actually, the model is based on the interaction between job demands and job control. On the one hand, the assumption is that control is needed to fulfil high job demands. On the other hand, it is assumed that high job demands are a prerequisite for work-based learning. However, to prevent work stress resulting from high job demands, control is considered a crucial factor. From the model two different hypotheses can be deduced: the strain hypothesis and the learning hypothesis. The first hypothesis is that work stress will occur when job demands are high whereas control is low. The second hypothesis is that learning and growth will occur in situations where both job demands and control are high. Although there is little empirical evidence confirming this second hypothesis, it may be concluded that job demands and job control do play a role in explaining participation in professional learning activities (Kwakman, 2001). Besides, the model bears face validity as the core factors within the model are also factors representing important working conditions in teachers' professional learning (Darling-Hammond & McLaughlin, 1996; Firestone & Pennell, 1993; Little, 1993; Rosenholtz, 1989; Smylie, 1995). Stress theory as well as theory concerning working conditions emphasize that job demands and job control are both multidimensional in nature and have to be operationalized carefully. So, they are broken into five task factors. Job demands can take different forms referring to three different factors (Söderfeldt et al., 1996). First, *pressure of work* refers to quantitative demanding aspects such as the pace of work and workload. Second, *emotional demands* refers to the extent to which the job requires emotional investment. Third, *job variety* measures the availability of learning opportunities as well as the amount of diversity the work offers. In accordance with the

work of Ganster (1989) who debates the meaning of the job control variable, two different factors referring to control were included in this research: *autonomy* and *participation*. Autonomy refers to teachers' freedom to determine different task-related characteristics such as the pace of work, the method, and work order (Firestone & Pennell, 1993). Participation refers to the influence a teacher has over the working environment and to opportunities to take part in decision-making (Firestone & Pennell, 1993).

Finally, three factors that address the work environment, more specifically different types of support available within this environment were added to the model. The support factor was included owing to the criticism of the Karasek model for neglecting this factor (Greenglass, Burke, & Konarski, 1997; Griffith, Steptoe, & Cropley, 1999; Guglielmi & Tatrow, 1998; Schaubroeck & Fink, 1998). The theoretical assumption—also confirmed by empirical results—is that a supportive work environment minimizes stress so that teachers who work in an environment perceived as supportive are less likely to experience high stress levels. Besides, numerous studies into stress as well as into school improvement relate support to stress and learning, indicating that support may bear relevance with regard to teacher participation in professional learning activities (Firestone & Pennell, 1993; Greenglass et al., 1997; Karasek & Theorell, 1990; Leithwood et al., 1999). In the literature social support as well as cultural support are both considered as important in this respect. Social support refers to the total amount of helpful social interaction of managers and colleagues that is available within the work context, as well as to instrumental and social-emotional aspects (Karasek & Theorell, 1990). Cultural support indicates the impact of the school culture as supportive factor in teachers' participation in professional learning activities. The underlying rationale is that the school has to provide an environment in which participation in professional learning activities is widely appreciated and therefore intentionally stimulated (Leithwood et al., 1999). Thus, two different social support factors were distinguished: *management support*, and *collegial support* whereas one cultural

support factor was included: *intentional learning support*.

Summarizing the results of the literature review into factors influencing teacher learning at the workplace, 13 different factors were revealed: five personal factors, five task factors, and three work environment factors.

Based on the outcomes of this first study, a research model (see Fig. 1) has been constructed in which features of the person, the task, and the work environment are independent variables, whereas participation in professional learning activity is a dependent variable.

To explore the relevance of this model, a second study was carried out consisting of a survey addressing the following two research questions:

1. To what extent do teachers participate in professional learning activities?
2. What are the effects of personal factors, and task and work environment factors on participation in professional learning activities?

2. Method

The study is exploratory in nature; it is not aimed at verifying hypotheses or testing the conceptual model. The main aim is to elicit factors relating to teacher learning (conceptualized as participation in professional learning activity). Therefore, only direct effects of personal, task, and work environment factors on teacher professional learning activity are studied. Although factors assumed to affect participation in professional learning activity may be interrelated or assert indirect effects, these relationships are not taken into account.

2.1. Sample and procedure

Data collection took place by means of a survey. A questionnaire was administered to all teachers in 10 secondary schools. These schools were not randomly selected. All schools providing secondary education at more than two levels within six middle-sized cities and three accompanying small
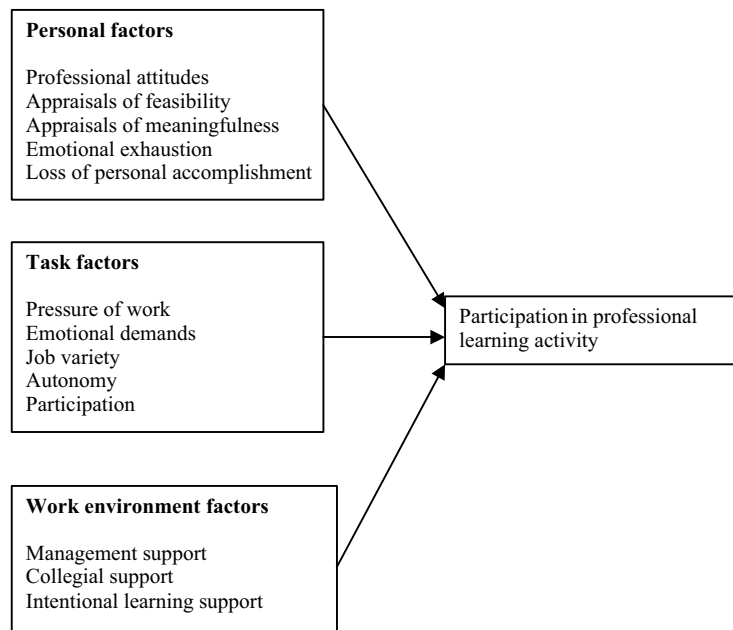

Fig. 1. Research model of professional learning activity.

villages in the Netherlands were invited to participate in the study. From these 60 schools, 13 schools responded positively. Eventually, 10 schools were willing to distribute the questionnaire among their teaching staff. Those schools mainly participated because of interest in the research topic and results that were offered in return of their investment.

As school participation was voluntary, this sample of 10 schools was compared with the total population of schools in the Netherlands. Five schools provide all levels of general as well as initial vocational education; three schools provide only general education (at all levels); two schools provide general education at the lowest level as well as initial vocational education. This proportion of different school levels is in accordance with the proportion in the total population of Dutch schools. Of the 939 teachers in these schools, 542 teachers returned the questionnaire (response rate of 59%). The sample consists of 367 men (68.3%) and 170 women (31.7%). The mean age of the sample is 45.8 years ($SD = 9.0$) whereas their mean working experience is 20.1 years ($SD = 9.8$). With respect to age and gender the sample is representative of the total population of teachers. However, the majority of the sample is over 40 years of age (74.7%), which means that in this respect the sample is not fully representative for the total population of teachers in the Netherlands (70%). With respect to their primary subject area, the group is divided as follows: 174 languages teachers (33%); 99 science teachers (18.8%); 79 social sciences teachers (15%); 76 teachers in arts or physical education (14.4%); 60 teachers in vocational education (11.1%); and 40 teachers in national curriculum subjects (7.6%). No data are available for the total population of teachers in the Netherlands regarding proportions teaching in each subject area.

2.2. Measures of professional learning activity

To measure participation in professional learning activity the range of 32 activities derived from the qualitative study was used. Therefore, activities were formulated as items as much as possible in accordance with the outcomes of the qualitative study (see Table 2).

Most professional learning activities were reformulated into one item each. Two activities were measured by one and the same item: 'receiving coaching or guidance', and 'coaching colleagues' were both formulated as 'collegial classroom observation' whereas the activity 'joining committees' was measured by two items referring to joining committees and subsequently informing and consulting with the school management. The resulting list of 32 activities was subjected to expert-review. Based on their opinions, 8 activities were excluded from the list that all teachers are expected to participate in, as these activities would not show sufficient range of variance in a survey study (see Table 2): preparing lessons individually, constructing tests, working with new methods, storytelling with colleagues, coordination, executing non-curricular tasks, classroom interaction with pupils, and teaching. Next, 4 activities in which only a few teachers participated, as supervising student teachers, counseling pupils, performing management tasks, and organizing extracurricular activities, were also excluded as the variance of those activities was also expected to be too low to allow for effective discrimination (see Table 2).

As the range of professional learning activities within the category of reflection was rather limited as a result of this, two new professional learning activities concerning reflection were added. Based on the qualitative study indicating that reflection springs also from interaction with pupils, an extra item was formulated as 'adapt way of teaching to pupils' needs'. Teachers' perspective revealed that this activity requires reflection-in-action. Next, a second extra item referring to explicit individual reflection was formulated: 'reflect individually on a lesson' as this is an activity that is stressed in literature. Thus, 22 activities were pilot tested to examine the range of variance. As a result, the activity concerning 'reading newspapers' had to be excluded as the skewness of this item exceeded 1.

Eventually, participation in professional learning activity was measured by 21 items divided within the four categories of reading, experimenting, reflecting, and collaborating. *Reading* was

Table 2
Measures of professional learning activities

Categories	Professional learning activities	Item in questionnaire
Reading	Studying subject matter literature	Study subject matter literature
	Reading professional journals	Read professional journals
	Studying teaching manuals	Study teaching manuals
	Reading newspapers	—
Experimenting	Helping students learning study skills	Help students to learn study skills
	Preparing lessons individually	—
	Experiment with new teaching methods	Experiment with new teaching methods
	Constructing lesson materials	Construct lesson materials
	Constructing tests	—
	Working with new method	—
Reflecting	Supervising student teachers	—
	Receiving coaching of guidance	Collegial classroom observation
	Coaching colleagues	Collegial classroom observation
	Receiving pupils' feedback	Ask pupils' feedback + Reflect individually on a lesson
Collaborating	(a) Storytelling	—
	(b) Help	
	Asking for help	Talk about teaching problems with colleagues
	Giving help	Support colleagues in teaching problems
	(c) Sharing:	
	Materials	Use colleagues' materials in own lessons
	Ideas about innovation	Share ideas about educational improvement
	Instructional issues	Share way of teaching with colleagues
	Ideas about pupil counseling	Share ideas about pupil counseling
	Ideas about education	Share ideas about education with colleagues
	(d) Joint work	
	Coordination	—
	Joining committees	Join a committee at the school + Give opinion to school management
	Preparing lessons	Prepare lessons with colleagues
	Implementing innovations	Make agreements about way of teaching
Not fitting into categories	Counseling pupils	—
	Executing non-curricular tasks	—
	Performing management tasks	—
	Organizing extracurricular activities for pupils	—
	Classroom interaction with pupils	Adapt way of teaching to pupils' needs
	Teaching in itself	—

measured by three items referring to different objects of reading: subject matter literature, professional journals, and teaching manuals. *Experimenting* was measured by three activities: help students to learn study skills, experiment with new teaching methods, and construct lesson materials. *Reflecting* was measured by four items representing different sources of feedback: collegial observation, pupils' feedback, individual reflection, and feedback springing from classroom interaction. *Collaborating* was measured by 11 items referring to three variants of collegiality. Thus, two activities refered to asking for help and to giving help, whereas five activities refered to sharing of teaching materials and to sharing of ideas. Activities referring to sharing of ideas were derived from the qualitative study that indicated that sharing ideas centered around four different subjects: innovation, instruction, pupil counseling, and education in general. The final four activities

all refered to 'joint work'-join committees, give opinions, prepare lessons together, and make agreements.

Teachers were asked to state how often they participated in each professional learning activity on a 4-point scale (1 = *hardly ever*, 2 = *sometimes*, 3 = *fairly often*, 4 = *often*).

2.3. Measures of personal, task, and work environment factors

Professional attitudes. These were measured by means of 12 items reflecting teachers' responsibilities with regard to attaining new reform goals, developing professionally, and collaborating at the school level. Teachers were asked to indicate to what extent they agreed with bearing these responsibilities on a 4-point scale (1 = *disagree*, 2 = *slightly disagree*, 3 = *slightly agree*, 4 = *agree*).

Appraisals of feasibility. Teachers were asked to state the feasibility of each activity on a 4-point scale ranging from *not feasible* to *very feasible*.

Appraisals of meaningfulness. Teachers were asked to state the meaningfulness of each activity on a 4-point scale ranging from *not meaningful* to *very meaningful*.

Emotional exhaustion. This variable was measured by means of three items referring to the extent to which teachers feel emotionally over-extended. Items were derived from the Dutch version of the Maslach Burnout Inventory for Teachers (Schaufeli et al., 1994). All items are scored on a 7-point scale: 0 = *never*, 1 = *hardly ever*, 2 = *seldom*, 3 = *sometimes*, 4 = *often*, 5 = *nearly always*, 6 = *always*.

Loss of personal accomplishment was measured by four items from the Maslach Burnout Inventory, referring to a decline in feelings of competence and successful achievement on the job.

Pressure of work. This variable was measured by means of seven items derived from a questionnaire of the Dutch Institute of Working Conditions (VBBA; Van Veldhoven & Meijman, 1994). All items refer to quantitative demanding aspects such as the pace of work and workload. Teachers were asked to indicate to what extent each item was relevant to their job on a 4-point scale (ranging from 1 = *hardly ever* to 4 = *always*).

Emotional demands were measured by four items from the VBBA; those items were selected that addressed the extent to which the teaching job requires emotional investment.

Job variety was measured by nine items from the VBBA; all items intend to measure the availability of learning opportunities as well as the amount of diversity the work offers.

Autonomy as referring to teachers' opportunity to determine different task-related characteristics such as the pace of work, the method, and work order was measured by seven items from the VBBA that were regarded as most relevant to the teaching profession.

Participation was also measured with seven items derived from the VBBA. Items address the perceived influence over the working environment as well as the opportunities to take part in decision-making.

Management support. This variable was measured by four 4-point scale items (ranging from 1 = *hardly ever* to 4 = *always*) derived from a Dutch questionnaire on organizational stress (VOS-D; Bergers, Marcelissen, & Wolff, 1986). Items refer to the amount of helpful social interaction of staff that is available.

Collegial support was measured by four items from the VOS-D that only differ from the management support items in that they address the amount of helpful social interaction of colleagues.

Intentional learning support was measured by 4 items referring to the four categories of professional learning activities. Teachers were asked to state on a 4-point scale (ranging from 1 = *hardly ever* to 4 = *always*) to what extent their school stimulated them to read, experiment, reflect, and collaborate.

2.4. Data analysis

Analysis was first directed at constructing scales. Therefore, factorial analyses (Principal Component Analysis) were executed for the items referring to professional learning activities, professional attitudes, appraisals, stress, task factors, and work environment factors separately. To determine the amount of factors the following

criteria were applied: eigen values > 1, the interpretation of factors, and the amount of factors in proportion to the amount of explained variance. All analyses were performed using 'listwise deletion' of missing scores, and using oblique rotation. Items belonging to a factor had to have a factor loading of 0.40 at the minimum within the rotated solution. Then, the reliability of each factor was calculated, followed up by inspection of item-characteristic curves to see whether the proportion of respondents increased monotonically with item scores.

Next, simultaneous multiple regression analysis was used to reveal relationships between independent factors and participation in professional learning activities. First, a hierarchical regression analysis was conducted to reduce the number of factors as far as possible, and so to reduce effects of multi-collinearity. Factors were controlled for linearity as well as for interaction effects. Only those factors that accounted significantly ($p < 0.05$) to the amount of explained variance were included in the final simultaneous regression analysis. Plots were inspected to verify the assumption of homoscedasticity as well as to localize outliers.

3. Results

3.1. Descriptive statistics

Results of factorial analysis (oblique rotation) on professional learning activities yielded three different factors referring to different types of professional learning activities, see Table 3. The amount of variance accounted for by these three factors was 40.5%, which can be regarded as satisfactory for a newly developed measurement instrument. Three items had to be removed to reach an acceptable factor structure: collegial classroom observation, talking about teaching problems, and individual reflection.

The first factor consists of six professional learning activities representing the three variants of collegiality within the category of collaboration, so they are all executed collaboratively. Therefore, this factor was called *Collaborative Activities*. The second factor includes seven items referring to professional learning activities within the categories of reading, experimenting, and reflecting. All activities constituting this factor are performed individually although some activities need

Table 3
Factor loadings of items representing professional learning activities

	Factor 1	Factor 2	Factor 3
Give opinion to school management	**0.80**	−0.06	−0.09
Share ideas about pupil counseling	**0.73**	0.05	−0.07
Join a committee at the school	**0.68**	0.01	−0.01
Share ideas about educational improvement	**0.62**	0.12	0.11
Share ideas about education with colleagues	**0.56**	0.07	0.23
Support colleagues in teaching problems	**0.51**	0.07	0.14
Study subject matter literature	−0.14	**0.66**	0.15
Read professional journals	0.08	**0.60**	0.00
Ask pupils feedback	0.11	**0.60**	−0.17
Experiment with new teaching methods	0.05	**0.53**	0.21
Study teaching manuals	−0.11	**0.51**	0.07
Adapt way of teaching to pupils' needs	0.17	**0.46**	−0.18
Help students to learn study skills	0.15	**0.45**	0.11
Prepare lessons with colleagues	0.10	−0.13	**0.71**
Construct lesson materials	−0.14	0.12	**0.65**
Share way of teaching with colleagues	0.10	0.04	**0.50**
Make agreements about way of teaching	0.33	−0.06	**0.49**
Use colleagues' materials in own lessons	−0.03	0.20	**0.46**

interaction with students in the classroom. So, this factor was named *Individual Activities*. The third factor comprises of five professional learning activities: four from the category of collaboration and one from the category of experimenting. So, these activities are not to be characterized as individual or collaborative. However, they all refer to practical instructional work related to preparing and delivering lessons. Therefore, this factor was labeled *Instructional Activities* (Kwakman, 1999).

So, factor analysis results differ from the theoretical conception of professional learning activities in two ways. First, three important items did not fit the factors empirically; one item addressing the category of collaboration (Little's variant of 'help') and two items referring to reflection. Secondly, factor analysis revealed different types of professional learning activities compared to the theoretical categorization of professional learning activities. Actually, factor analysis results only distinguish collaborative activities from all three other categories. Activities within the categories of reading, experimenting, and reflection appeared to relate to each other indicating that those activities share common aspects. However, factor analysis also indicates that collaboration does not break neatly down into Little's variants, but into two types that refer to different aims of collaboration. These empirical outcomes are strongly favored as they provide a rationale for teachers to participate in specific professional learning activities rather than just valuing professional learning activities separately. It appears that professional learning activities are centered on tasks that teachers accomplish in practice, as the factors show that professional learning activities relate to each other in a way that resemble different tasks within the teaching profession as perceived by teachers themselves. So, professional learning activities are performed in the context of operating within the school organization, improving teaching, and (joint) preparation of lessons and materials. This leads us to support the idea that not only knowledge is event-structured (Putnam & Borko, 2000), but that professional learning activities may be structured the same way as well, at least in the perception of teachers. Considering this may explain that three

items did not fit into the empirical factors, as all these are not directly related to specific tasks or events but rather to the person of the teacher. Moreover, the low participation in collegial classroom observation offers an extra explanation for not fitting into one of the factors.

Concerning independent variables, factor analysis yielded a large number of factors due to the multidimensionality of the variables, as expected. Although some items had to be removed in order to reach an acceptable factor structure, a scale could be constructed for every original variable. Only for appraisals of feasibility did factor analysis reveal two factors instead of one. Feasibility was broken down into Feasibility of Collaborative Activities and in Feasibility of Innovative Activities. We use this new term 'innovative activities' because appraisals of activities within this scale both refer to Individual Activities as well as to Instructional Activities.

Table 4 shows the descriptive statistics of the three types of professional learning activity and of all other scales representing independent factors.

3.2. Participation in professional learning activities

The frequency of participation in each professional learning activity is shown in Table 5. The activities are ranged from low participation to high participation. For each professional learning activity the corresponding factor is also indicated: (CA): collaborative activities, (IA): individual activities, and (IsA): instructional activities. No factor is mentioned for activities that had to be removed from the analysis.

3.3. Regression results

At first, correlation between predictor factors and three types of professional learning activity was calculated (see Table 6).

Next, regression analyses were conducted for each type of professional learning activity. Results were controlled for gender and subject matter (dummy variables) and for years of professional experience. As a lot of older women are entering the teaching profession now-a-days, years of

Table 4
Descriptive statistics of factors

Factors	*M*	Range	*SD*	Alpha	Number of items
Collaborative activities	2.29	1–4	0.58	0.77	6
Individual activities	2.43	1–4	0.46	0.65	7
Instructional activities	2.25	1–4	0.49	0.58	5
Professional attitudes	3.11	1–4	0.52	0.75	6
Feasibility of collaborative activities	2.70	1–4	0.62	0.78	6
Feasibility of innovative activities	2.69	1–4	0.54	0.66	6
Meaningfulness of activities	3.26	1–4	0.42	0.81	13
Loss of personal accomplishment	2.20	0–6	0.68	0.72	4
Emotional exhaustion	2.68	0–6	1.08	0.82	3
Pressure of work	2.41	1–4	0.56	0.87	7
Emotional demands	2.12	1–4	0.49	0.64	3
Job variety	2.66	1–4	0.52	0.82	7
Autonomy	2.65	1–4	0.54	0.73	5
Participation	2.38	1–4	0.55	0.76	5
Management support	2.95	1–4	0.69	0.87	5
Collegial support	3.21	1–4	0.55	0.79	4
Intentional learning support	2.57	1–4	0.54	0.66	5

Table 5
Mean scores on professional learning activities (1 = hardly ever, 4 = often)

Professional learning activities	*M*
Collegial classroom observation	1.22
Prepare lessons with colleagues (IsA)	1.69
Ask pupils feedback (IA)	1.84
Use colleagues' materials in own lessons (IsA)	2.01
Support colleagues in teaching problems (CA)	2.09
Give opinion to school management (CA)	2.10
Read professional journals (IA)	2.11
Share ideas about pupil counseling (CA)	2.17
Join a committee at the school (CA)	2.34
Experiment with new teaching methods (IA)	2.38
Share ideas about educational improvement (CA)	2.39
Make agreements about way of teaching (IsA)	2.43
Talk about teaching problems with colleagues	2.47
Adapt way of teaching to pupils' needs (IA)	2.49
Share way of teaching with colleagues (IsA)	2.51
Reflect individually on a lesson	2.55
Construct lesson materials (IsA)	2.59
Share ideas about education with colleagues (CA)	2.63
Study teaching manuals (IA)	2.64
Study subject matter literature (IA)	2.74
Help students to learn study skills (IA)	2.83

Note: (CA) = collaborative activities; (IA) = individual activities; (IsA) = instructional activities.

experience is considered a better measure than age. The standardized significant beta weights and amount of explained variances of predictor variables on three types of professional learning activities are presented in Table 7.

It is noteworthy that one of the stress factors, Emotional Exhaustion, and both task factors, Autonomy and Participation, are not included in Table 7 as they appeared to show no direct effects on any of the types of professional learning activity. All other factors exert an effect on at least one type of professional learning activity. Secondly, in comparison with the correlation analysis, regression analysis in which joint effects are determined reduces the number of factors that appeared to be significant. Regarding the first type of professional learning activity, Collaborative Activities, 11 factors showed some significant direct effects where the amount of variance accounted for by these factors is reasonably high. Concerning the Individual Activities, 8 factors proved to be significant and the amount of explained variance is also rather high. The third type, Instructional Learning is also affected by 8 factors, although the proportion of explained variance is much smaller.

With the exception of the negative effects of Appraisals of Feasibility and Management Support, the direction of effects is in concurrence with results from the correlation analysis. Closer examination of those negative effects indicated

Table 6
Correlation between independent variables and three types of professional learning activity

	Types of professional learning activity		
Independent variables	Collaborative activities	Individual activities	Instructional activities
Professional attitudes	0.31*	0.40*	0.23*
Feasibility of collaborative activities	0.50*	0.18*	0.16*
Feasibility of innovative activities	0.16*	0.44*	0.32*
Meaningfulness of activities	0.40*	0.42*	0.36*
Loss of personal accomplishment	−0.28*	−0.28*	−0.10*
Emotional exhaustion	−0.05	−0.13*	−0.06
Pressure of work	0.15*	0.02	0.05
Emotional demands	0.20*	0.16*	0.15*
Job variety	0.26*	0.26*	0.17*
Autonomy	0.08	0.08	0.04
Participation	0.27*	0.12*	0.11*
Management support	0.11*	0.02	0.09*
Collegial support	0.12*	0.05	0.21*
Intentional learning support	0.25*	0.20*	0.18*

*$p < 0.05$, two-tailed.

Table 7
Significant standardized beta weights and explained variances of simultaneous regression analysis for variables predicting three types of professional learning activities ($p < 0.05$).

	Types of professional learning activity		
Predictor variables	Collaborative activities	Individual activities	Instructional activities
Gender (1 = female)	−0.07		
Subject matter (1 = arts/physical education)	−0.10		
Subject matter (1 = science)			−0.22
Subject matter (1 = languages)			−0.17
Subject matter (1 = social sciences)			−0.16
Professional experience	0.29		
Professional attitudes	0.12	0.20	
Feasibility of collaborative activities	0.41	−0.13	−0.10
Feasibility of innovative activities	−0.13	0.36	0.24
Meaningfulness of activities	0.20	0.22	0.26
Loss of personal accomplishment	−0.16	−0.18	
Pressure of work	0.10		0.11
Emotional demands	0.09	0.14	0.10
Job variety	0.16		
Management support		−0.16	
Collegial support			0.17
Intentional learning support		0.12	0.09
R^2	0.49	0.40	0.29

that this might be due to a suppressor-effect caused by high correlation among predictor variables. Although a hierarchical regression analysis preceded the final simultaneous regression analysis to prevent such effects, those negative effects are to be contributed to the structure of the data. So, the negative effects from both these variables may not be interpreted as research results. This also leads us to conclude that Management Support can be excluded from the model as it is no predictor of participation in professional learning activities. However, the

positive effects of the Appraisals of Feasibility validate the inclusion of both feasibility variables within the model.

All other negative effects are ascribed to data defining and to measurement procedures. Effects of gender and subject matter are attributed to the way dummy variables were scored, whereas the negative effects of Loss of Personal Accomplishment only points out that a larger loss of accomplishment (thus more stress) relates to a lower frequency of Collaborative and Individual Activities.

4. Conclusions and discussion

Several important findings that contribute to the understanding of teachers' professional learning activities resulted from this study.

First, the survey revealed three empirical types of professional learning activities that differ markedly from the theoretical categorization of professional learning activities. A possible explanation for this discrepancy is that teachers perceive professional learning activities in connection with different tasks that belong to the teaching profession. Although some professional learning activities did not fit into these empirical types, the idea that professional learning activities are embedded in different tasks, as perceived by teachers themselves, confirms the notion of situated cognition in which it is assumed that learning is embedded in everyday activities. This result also has consequences for further research into professional learning activities as it clearly shows that from the perspective of teachers, learning may best be examined in connection to teachers' concrete tasks and daily activities.

Secondly, the study results suggest that the frequencies of participation in various professional learning activities differ to a large extent. It is striking that the frequency of activities that address feedback from classroom observation and from students is rather low, as was the frequency of collaborative activities that demand more than just talking or discussing. Teachers participate most in activities as professional read-ing, sharing ideas with colleagues, or improving lessons.

Thirdly, the study provides empirical evidence for a number of factors that predict participation in professional learning activities. Examination of the beta weights for the significant predictor variables indicates which variables accounted for significant variance in professional learning activity. It is concluded that different combinations of predictor variables account for this variance in each type of professional learning activity. Only one factor (Meaningfulness of Activities) exerts an effect on all three types of activities. Three factors did not exert any effect. Thus, all other factors are somehow related to participation in professional learning activities. But of these factors, personal factors appear to be more significant in predicting professional learning activities than task and work environment factors. Although task and work environment factors show effects, these effects are much smaller than effects of personal factors. Besides, although the factors in the model jointly account for a significant amount of variance in all three types, it may be concluded that the research model provides the best explanation for Collaborative Activities and least for Instructional Activities. This implies that other factors have to be added to the model in order to raise the amount of explained variance. Nevertheless, this study suggests that it would be worthwhile to look for factors that are connected to specific types of professional learning activity separately.

What do these results contribute to our understanding of teachers' professional learning? Our first remark addresses the concept of learning as participation in professional learning activities, which was based on the idea that cognition is situated in nature. So, we may not draw conclusions regarding teachers' professional learning but with regard to teachers' participation in a restricted range of professional learning activities. Nevertheless, we would like to stress that theorising about the domain of teacher learning would benefit greatly from further research in which participation in professional learning activities is related to learning outcomes and processes. However, examining learning results and processes will require more extensive research in order to

produce knowledge needed to establish how teacher learning may contribute to reaching desired reform outcomes.

In spite of these limitations, this study reveals great discrepancies between theory and practice in opportunities for professional learning at the workplace for secondary level school teachers.

First, a discrepancy is revealed regarding the range of professional learning activities that teachers participate in. Theory stresses the importance of a large range of professional learning activities to help teachers develop professionally. However, this research reveals that the frequency to which teachers participate in some activities is rather disappointing, considering the high value that is attached to them. The range of activities is more restricted in practice indicating that some reflective and collaborative professional learning activities are not very common in real school organizations. This conclusion does not apply to reflection generally, as this study shows that individual reflection and reflection in action take place rather frequently. So, teachers do reflect but not in ways in which they make use of explicit feedback from colleagues or students.

A second discrepancy concerns the role of the school context in teachers' participation in professional learning activities. The minor effects of task and work environment factors are not in accordance with the significant role that different perspectives and theories attribute to the school context in enhancing teacher learning. On the contrary, this study shows that participation in professional learning activities depends to a large extent on personal characteristics of teachers themselves. As all task and work environment factors (except Intentional Learning Support) were measured with existing instruments that were extensively tested for validity and reliability, the minor effects of task and work environment factors are unlikely to be due to measurement errors. Nevertheless, they may be ascribed to a possible interaction between personal and environmental variables that is captured by the measurement of attitudes and appraisals. There is evidence both from our own data as well as from other research into learning at the workplace (Van Woerkom, Nijhof, & Nieuwenhuis, 2001) indicat-ing that the effects of task and work environment factors are diminished if personal factors are included in the analyses simultaneously. This means that task and work environment factors do affect teachers' participation in professional learning activities, but that this effect is mediated by personal characteristics. This brings to the fore the idea that the effects of task and work environment factors may be indirect rather than direct. This conclusion has to be interpreted with caution, as new research has to be carried out to explore these types of relationships between variables thoroughly.

Actually, the first discrepancy raises serious questions about opportunities for participation in professional learning activities in secondary schools. How do we explain the restricted range of teachers' participation in professional learning activities? Although it may be the case that teachers also learn in other ways than those examined in this study, the low participation in many of the professional learning activities measured indicates that powerful opportunities for teachers to learn remain unused in practice. Do we have to conclude that schools are not suited for some professional learning activities to take place? Or that the workplace poses severe limitations to the kinds of professional learning activities in which teachers may participate? These questions once again bring to the fore the difference in perspectives of cognitive psychology and professional development theory regarding the role of the workplace in teachers' professional learning. The main conclusion to draw is that although the workplace is considered a powerful learning environment in theory, this workplace is not powerful in itself in practice. In order for a higher participation in professional learning activities, two different solutions can be proposed. First, we may conclude that the workplace is not a suitable venue for learning to occur and thus choose to organize learning for teachers outside of schools. Secondly, we may argue that the workplace has to fulfil certain conditions that are not present in schools at the moment, thus we are obliged to build these conditions into school organizations in order to stimulate learning. We strongly adhere to this second line of reasoning, which is also present

in literature that stresses that learning at the workplace requires an adequate infrastructure for learning (Darling-Hammond, 1998; Hargreaves, 1997; Jenlink & Kinnucan-Welsch, 2000; Moore & Shaw, 2000; Rosenholtz, 1989; Wenger & Snyder, 2000). As schools lack this infrastructure (Moore & Shaw, 2000; Scribner, 1999) it is no wonder that learning at the workplace is not very prominent at the moment. In order to gain more insight into the strengths and limitations of the workplace as a learning environment, the work context needs much more attention and even intervention. Nevertheless, these interventions have to be directed specifically towards designing the working environment as a learning environment for teachers. Such interventions do not address particular learning events organized by staff developers, but concern structural and cultural changes within schools that provide time and stimulus for those activities that are characteristic of strong professional communities, such as interaction and reflection (Hargreaves, 1997). So, it is strongly recommended that researchers and staff developers collaborate with schools and teachers in jointly designing and creating those interventions and in investigating their effects. Only when we know more about how these interventions affect learning will we be able to judge the potential of teachers' workplace as a setting for learning.

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