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Teachers' Everyday Professional Development Mapping Informal Learning Activities, Antecedents, and Learning Outcomes — [Source link](#)

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Published on: 02 Feb 2016 - Review of Educational Research (SAGE Publications)

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Reference:

Kyndt Eva, Gijbels David, Grosemans I., Donche Vincent.- Teachers¹ everyday professional development : mapping informal learning activities, antecedents, and learning outcomes

Review of educational research - ISSN 1935-1046 - (2016)

Full text (Publishers DOI): <http://dx.doi.org/doi:10.3102/0034654315627864>

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Antecedents and Learning Outcomes

Abstract

Although a lot is known about teacher development by means of formal learning activities, research on teachers' everyday learning is limited. In the current systematic review, we analyzed 74 studies focusing on teachers' informal learning in order to identify teachers' learning activities, antecedents for informal learning, and learning outcomes. In addition, we examined whether beginning and more experienced teachers differ with regard to informal learning. Results revealed different types of learning activities in the two groups and interesting relationships among different antecedents and various learning outcomes. Moreover, it can be concluded that the main difference between beginning and more experienced teachers lies not in the type of learning activities they undertake, but rather in their attitudes toward learning, their learning outcomes, and how they are influenced by their context.

Keywords: Teacher learning; Informal learning; Systematic review

Teachers' Everyday Professional Development: Mapping Informal Learning Activities, Antecedents and Learning Outcomes

Recently, the professional development of teachers through informal learning processes has been brought to the fore (e.g., Bakkenes, Vermunt, & Wubbels, 2010; Burns, 2008; Hoekstra, Brekelmans, Beijaard, & Korthagen, 2009; Melber & Cox-Petersen, 2005). Although a lot is known about teacher development by means of formal learning activities (Borko, 2004), research on teachers' everyday learning is more limited (Hoekstra, Brekelmans, et al., 2009) and a systematic overview of these learning activities and their outcomes within the specific context of teachers' professional development is lacking. Informal learning has received an increased amount of attention in the broader literature, especially since the 1990s (Eraut, 2004; Marsick & Watkins, 1990; Van der Heijden, Boon, van der Klink, & Meijjs, 2009). In addition, several studies suggest that informal learning is the most frequently used type of workplace learning (Hara, 2001; Hicks, Bagg, Doyle, & Young, 2007; Leslie, Aring, & Brand, 1998; Skule & Reichbron, 2002).

Although many countries require teachers to attend mandatory staff development activities (e.g., courses, workshops, training) and teachers' professional development is highly valued, little support is provided for teacher learning in the workplace itself (Hoekstra, Brekelmans, et al., 2009; Richter, Kunter, Klusmann, Lüdtke, & Baumert, 2011). However, this lack of support does not mean that teachers do not learn in the workplace, as teachers do report undertaking different types of activities even when specific support is missing (Hoekstra, Brekelmans, et al., 2009). Concurrently, there is much agreement about the limitations of traditional formally organized training activities, but insight into the informal learning activities teachers undertake is generally missing (Fraser, 2010; Kwakman, 2003), making it difficult to foster informal learning as well as to value its outcomes.

One goal of this study is to identify which specific learning activities occur without

any support and can be considered informal learning within the literature on teachers' professional learning (i.e., the development of a typology on learning activities), because an integrated overview of teachers' informal learning activities is lacking (Fraser, 2010; Kwakman, 2003). Secondly, the antecedents of informal learning will be considered, because it is important to gain insight into how informal learning can be supported, encouraged, and developed (Marsick & Volpe, 1999). In the current review, we aim to identify the antecedents of informal learning that are relevant within the school setting. We then explore which learning outcomes result from these informal learning activities. It has been argued that it is difficult to understand these outcomes because the concept of informal workplace learning outcomes is broader than that of academic performance. It has also been argued that such learning outcomes are workplace-specific and closely related to the context (Eraut, 2004; Kyndt, Govaerts, Verbeek, & Dochy, 2014). Focusing on one specific context has the potential to reveal interesting results.

In addition to the increased attention to teachers' informal learning, it is also important to note that the teaching profession, much like other professions, is not immune from current demographic and societal shifts. Along with the rising retirement age, older employees are expected to continue their professional development (Kyndt, Michielsen, Van Nooten, Nijs, & Baert, 2011). Both the teacher learning literature and the broader literature on work-related learning, research show that employees' participation in formally organized learning activities declines with age (Kyndt & Baert, 2013; Richter et al., 2011). Although research on the impact of age on informal learning is rather scarce, it seems that age plays a different role in informal learning activities (Schulz & Stamov Roßnagel, 2010). However, within the teacher learning literature, beginning teachers are often distinguished from more experienced teachers (e.g., Burns, 2008; Harrison & McKeon, 2008; Hoekstra, Beijaard, Brekelmans, & Korthagen, 2007). Therefore, a final goal of this article is to examine

differences with regard to the uptake of informal learning activities throughout the teaching career.

Defining Informal Learning

Definitions of informal learning often contrast it with formal learning. Formal learning refers to learning activities that are structured in terms of time, space, goals, and support. It is undertaken intentionally in order to develop knowledge and competences (Eraut, 2004; Streumer & Van der Klink, 2004). However, these two forms of learning should not be dichotomized; in fact, they represent the ends of a sliding scale of formality, ranging from totally unorganized learning as a by-product of working to learning that is organized within an educational setting. Thus, formal and informal learning should be considered to be on a continuum (Eraut, 2004; Kyndt et al., 2014). Although informal learning is ubiquitous in every organization, it is never sufficient on its own. On the one hand, what is implicitly learned through informal learning might not always be desirable; therefore, solely relying on informal learning does not seem adequate. On the other hand, implicit informal learning can be transformed into explicit learning by means of formal learning (Slotte, Tynjälä, & Hytönen, 2004). They should both be seen as equally important elements of workplace learning (Slotte et al., 2004; Svensson, Ellström, & Åberg, 2004).

Based on prior research regarding the professional learning of different occupational groups, such as accountants (Hicks et al., 2007), lawyers (Hara, 2001), human resource management practitioners (Crouse, Doyle, & Young, 2011), and nurses (Berings, Poell, & Gelissen, 2008; White et al., 2000), among others, Kyndt et al. (2014, p. 2393-2394) formulated the following definition of informal learning:

Informal learning is characterized by a low degree of planning and organizing in terms of learning context, learning support, learning time, and learning objectives.

Informal learning opportunities are not restricted to certain environments. The

learning results from engagement in daily work-related activities in which learning is not the primary goal. Informal learning is undertaken autonomously, either individually or collectively, but without an instructor. It often happens spontaneously and unconsciously. From the learner's perspective, it is unintentional. Finally, informal learning outcomes are unpredictable.

In general, a less detailed definition is used within the context of teacher professional development. For example, Hoekstra, Brekelmans, et al. (2009), investigating the informal learning of experienced teachers, stated that "informal learning refers to learning in the workplace where systematic support of learning, such as professional development trajectories, is absent" (p. 663). Richter et al. (2011) stated that informal learning opportunities "do not follow a specified curriculum and are not restricted to certain environments" (p. 117). Most studies provide examples of learning activities (e.g., sharing resources, reading professional literature, experimenting with new techniques) to solidify this definition (e.g., Lohman, 2006; Pedder, 2007). In the current review, we will focus on the informal learning activities that occur in the everyday practice of teachers in schools.

Antecedents of informal learning. As noted previously, a second goal of this study is to examine the antecedents of informal teacher learning in order to gain insight into how informal learning can be supported, encouraged, and developed (Marsick & Volpe, 1999). When integrating a large number of study results, a heuristic framework is needed to structure the vast amount of information. For this study, the model of Baert, De Rick, and Van Valckenborg (2006) was used. This model proposes that the antecedents of employee learning can be organized on three levels: the individual or micro-level, the learning activity or meso-level, and the social context and its actors or macro-level.

Both individual characteristics (e.g., personality, attitude, and general characteristics such as age, tenure, educational discipline, background) and job characteristics (e.g.,

allocation and job design) can be situated at the micro-level (Kyndt & Baert, 2013). Baert et al. (2006) located all characteristics of the learning activity at the meso-level, including instructional design and expected benefits. However, in Kyndt and Baert's study, the characteristics at this level pertained primarily to aspects of formally organized learning activities in which the employee participates after a rational decision-making process. Finally, the macro-level includes characteristics of the organization, in this case, the school (e.g., culture, social support) and the broader context (e.g., policy, community).

Informal learning outcomes. An important question when investigating learning is what results from the learning process. Kyndt et al. (2014, p. 2396) stated, "there is great value in rendering tacit learning outcomes visible. By doing so, the learning outcomes can be consciously used in improving work-related roles and tasks." In general, learning outcomes are defined as sustainable changes in knowledge, skills or attitudes as a result of engaging in learning activities (Doyle, Reid, & Young, 2008; Matthews, 1999). Eraut (2004) identified several specific characteristics of learning outcomes resulting from informal learning. He stated that the knowledge, skills, and attitudes applied at work are integrated and connected to the workplace, and should therefore be approached in a holistic manner. The construction of these knowledge, skills, and attitudes is inherently social and authentic in nature. For example, knowledge is not only learned at a theoretical level; employees also learn how, when, and under which circumstances to apply it. Within a specific organization, it might or might not always be appropriate to use what has been learned in every situation.

Teachers' career development. Although every teacher's career follows a unique path, prior research has identified common aspects of teachers' individual development in terms of knowledge, skills, and goals, as well as their position within the school community (Richter et al., 2011). Based on these common aspects, several career stage models have been conceptualized in which discrete consecutive stages of teachers' careers are described.

Rolls and Plauborg (2009) provided an extensive overview of the most influential teacher career stage models in the literature. In their chapter, they discuss the models from Huberman (1993), Fessler (1995), Sikes (1985) and Day and Sachs (2004), supplemented by other relevant research on teachers' professional lives, starting from the point when teachers have finished their initial educational training.

Teachers in the first three years of their career are often considered beginning teachers. This phase of the teaching career is characterized by a confrontation with the reality of teaching, and beginning teachers' foremost concern is dealing with pupil behaviors. Beginning teachers experience contradictory emotions ranging from complete despair to joy and fulfillment (Rolls & Plauborg, 2009). Furthermore, they try to earn the respect of their colleagues and start to affiliate themselves with the school community. In terms of teachers' professional development, Huberman (1993) stated that beginning teachers show an eagerness to learn. However, beginning teachers are rarely supported or guided in a formal way by their colleagues when dealing with the challenges that occur at the start of their careers (Tickle, 1994). They sometimes make informal approaches to colleagues, but might be reluctant to do so because they fear that they may come across as incompetent (Tickle, 1994).

Rolls and Plauborg (2009) noticed that research interest in mid-career teachers is relatively scarce. In this phase, teachers either commit to the teaching profession or explore other career possibilities. Those who continue teaching generally strive for greater responsibilities or promotions that are often reached by the end of the mid-career. In Sikes's (1985) model, being promoted is especially considered important by men, as it is argued that women in general put their children before their career. However, it should be noted that the societal context has changed considerably since the 1980s when Sikes conducted her research. Nowadays, these gender differences may be less explicit.

In general, the mid-career of teachers is described as the time period when energy, commitment, ambition, and self-confidence are at their highest (Rolls & Plauborg, 2009). Regarding teachers' professional development, Huberman (1993) stated that mid-career teachers refine and diversify their instructional techniques through experimentation (Richter et al., 2011). As mentioned, not all teachers commit to the teaching profession, and even those who commit experience difficult moments. In the various career stage models, frustrations occur in the second half of the mid-career period; Sikes (1985) referred to a mid-career crisis (ages 37 to 45), whereas Fessler (1995) used the term, career frustration, to describe a period of disillusionment. Huberman (1993) situated a reassessment phase at around 7 to 18 years into the career. The majority of the research on mid-career teachers tends to focus on the "problem" teachers who leave the occupation (Rolls & Plauborg, 2009).

Approaching retirement occupies a central place in teacher career stage models. However, due to the fact that teachers are "on their way out," little research has focused on this specific phase, and it is usually only considered when the career as a whole is investigated (Rolls & Plauborg, 2009). After more than 30 years of experience, teachers feel confident about their teaching abilities, and their levels of job satisfaction are primarily related to their relationship with their pupils and their pupils' accomplishments. On the other hand, the models also suggest that the motivation of teachers approaching retirement decreases and they begin a gradual withdrawal from professional commitments, becoming more selective about the professional activities they undertake. The end of the career is also characterized by mixed emotions; an appraisal of their career can result in pleasant memories or bitter regrets (Rolls & Plauborg, 2009).

The individual career stage models are more specific than the overarching description provided above, as they distinguish between five to eight specific career stages. These models also depict the teaching career as a linear process, although Fessler (1995) did

emphasize the cyclical nature of the different phases. However, it is clear that the main similarities among the different models are related to the beginning phase of the teaching career. In the current study, we will therefore focus on how beginning teachers differ from their more experienced colleagues in terms of undertaking informal learning activities.

The Present Study

This study focuses on teachers' informal learning during everyday practice. One goal of the current review is to develop a typology of different types of learning activities that are considered informal learning. This typology will be based on the concrete learning activities identified in empirical studies derived from a systematic search of the literature.

Accordingly, the first research question (RQ) of this study is as follows:

Which activities are considered to be informal learning in the literature on teachers' professional learning? It is also important to understand which factors inhibit or enhance teachers' informal learning. Therefore, the second research question asks, "What are the identified antecedents of teachers' informal learning?"

Third, throughout the literature on informal learning, one of the issues that is consistently highlighted is the difficulty of measuring the effects or outcomes of this type of learning. The third question asks, "What are the identified learning outcomes of teachers' informal learning?" The fourth and final goal of this theoretical study is to shed light on the differences in informal learning that occur between teachers at the start of their career and their more experienced colleagues. Consequently, the fourth question addresses whether there are identifiable differences between beginning and experienced teachers regarding informal learning.

To answer these research questions, we adopted a mixed method approach at the synthesis level (Heyvaert, Maes, & Onghena, 2011, 2013). Mixed method research at the level of synthesis or review of empirical studies has been gaining attention. Heyvaert et al.

(2013, p. 660) argued that mixing qualitative and quantitative methods when conducting a systematic review study can lead to “a more integrated and differentiated understanding and insight.” They defined a mixed method research synthesis as one “in which researchers combine qualitative, quantitative, and mixed methods studies, and apply a mixed methods approach in order to integrate those studies, for the broad purpose of breadth and depth of understanding and corroboration” (Heyvaert et al., 2013, p. 662). Concretely, this approach means that studies using qualitative, quantitative, and mixed method approaches are included in the review. In addition, it means that both qualitative analyses (e.g., content analysis) and quantitative analyses (e.g., for this study, inter-rater reliability, frequencies) of the results of the studies are combined and integrated in order to draw conclusions about the current state of the art of the literature (Heyvaert et al., 2013).

Method

The search for, selection, and analysis of the studies included in this systematic review were completed in different phases. First, a literature search of several scientific databases was performed. Second, irrelevant literature retrieved from these databases was eliminated based on several criteria. Third, the selected literature was critically appraised in order to exclude studies of low quality. Finally, the studies were analyzed following the guidelines of Aveyard (2010).

Literature Search

A thorough and transparent search of the literature is very important for a systematic review (Kyndt & Baert, 2013). For the current literature search, various education databases were consulted. In total, four databases were included in the search: ERIC (Ebsco), Francis, PsycINFO, and Social Science Citation Index (SSCI). The search terms were “Informal learning,” “Incidental learning,” “Implicit learning,” “Everyday learning,” “Workplace learning,” and “Professional learning.” Given the focus of this review study, these search

terms were combined with the search term “Teacher” or “Teaching staff.” This initial search retrieved 11,807 articles.

As noted in the introduction, a substantial increase in attention to informal learning occurred around the year 1990. Therefore, we limited our search to articles published from 1990 onward. This limitation resulted in only a minor decrease in search results: 11,207 articles remained. An overview of the results of the initial search can be found in Table 1.

Literature Selection

The selection of the literature for inclusion was based on eight criteria. The first criterion for inclusion was already mentioned above, that is, literature from 1990 or later. Second, only empirical studies were included in the analysis. Studies had to focus on the professional development (Criterion 3) of teachers (Criterion 4). Because this study focuses on teachers whose main task is teaching, only studies investigating teachers from primary and secondary education were included (Criterion 5). Lecturers in higher education often have tasks in addition to teaching (e.g., research, policy), making it difficult to determine whether teaching is their main responsibility or not. Studies that focused on student teachers were not included (Criterion 6), nor were studies that solely investigated teachers' formal learning (Criterion 7). Finally, the learning activities investigated in the study needed to be aligned with the definitions presented in the theoretical background of that study (Criterion 8).

The selection process followed a number of steps. After the limitation of studies based on publication year (Step 1), the second step involved the elimination of double records using EndNote software, leaving 9,706 articles. In the third step, articles were eliminated based on the title, leaving 2,474 articles. Manuscripts eliminated in this step did not focus on teachers or teacher development; they focused on teacher education (students) or lecturers in higher education, or the article was a non-unique record (manual elimination). Next, the abstracts of the studies were screened (Step 4). Articles that focused solely on formal learning were also

eliminated, leaving 200 articles. Then the full texts were retrieved, and a further selection was made based on scanning/diagonal reading of the full text (Step 5). The majority of the full texts could be retrieved through the subscriptions held by the authors' institutions. When this was not possible, the authors of the studies were contacted. Several corresponding authors forwarded their manuscript; a minority did not respond. However, it was not possible to contact all authors, due to missing or outdated correspondence information. In total, 27 full texts could not be retrieved and consequently were not included. Furthermore, (a) theoretical papers (used for background, not for analysis, $n = 11$) and (b) articles applying definitions that were not aligned with the theoretical background ($n = 94$) were excluded. After this fifth step, 68 articles remained; the full text of each of these was read in depth (Step 6). Seven more articles were eliminated based on the same elimination criteria as in the previous steps after this second reading. Subsequently, references were back-traced, leading to the identification of seven additional articles (Step 7).

The initial search was conducted in June 2012; the process of conducting a systematic review is a time-intensive activity, and almost two years passed before a first draft of the manuscript was completed. At that time, the authors searched the literature again (Step 8) to see if any manuscripts published during those two years fit the criteria for inclusion. The original search procedure was used¹. In total, 346 new hits were narrowed down to 10 additional articles. These steps resulted in 78 articles for analysis.

Critical Appraisal

The quality of the selected studies ($n = 78$) was evaluated using critical appraisal tools. To assess the qualitative (QL, $n = 48$) and mixed-method (MM, $n = 15$) research studies, the guidelines from the Critical Appraisal Skills Programme (CASP; 2013) were used. We selected the CASP tool because it is a widely used and user-friendly appraisal tool, despite its

¹ PsycInfo could not be consulted for the year 2014 due to a change in the subscriptions of the authors' institutions.

limitations in terms of sensitivity (Hannes, Lockwood, & Pearson, 2010). Use of this procedure increases the generalizability of the appraisals conducted in this study.

Quantitative studies (QN, $n = 15$) were assessed in a similar way, based upon the main criteria described by Aveyard (2010) and the checklists of the National Institute for Health and Clinical Excellence (NICE, 2009). The latter instruments and guidelines were selected because of their similarity to the CASP tool.

The main criteria for the quality appraisal were (a) a well-focused research question; (b) an appropriate research design; (c) a well-described and appropriate sampling strategy, data collection, and analysis method; and (d) a clear description of the research findings. Each study was given a rating: low, medium, or high quality (see Appendices 1 and 2). Low-quality studies were excluded from the analysis. It is important to acknowledge that the low quality rating does not necessarily mean that the actual execution of the study was poor; in the majority of the cases, it meant that not enough information was provided in the manuscript to adequately apply the criteria for the quality appraisal. For example, the majority of the studies did not explicitly discuss the relationship between the researchers and participants or the ethical aspects of the research. However, because research into teachers' informal learning typically does not involve actions or inquiries that could harm the participants (e.g., deception, hazards or discomforts, confidential patient information required), ethics committee approval may not have been needed. Therefore, it is not surprising that this information was not explicitly included in the manuscripts. After the critical appraisal, four articles were excluded due to low quality, leaving 74 studies for analysis (QN = 13, QL = 46, MM = 15).

Analysis of Literature

As previously mentioned, the analysis was based upon Aveyard's (2010) guidelines. First, every study was read and the study characteristics were inventoried (see Appendix 3).

Subsequently, each study was reread and thoroughly explored. Important paragraphs were coded using the content analysis method. These paragraphs were assigned to the following themes: Learning activities (RQ1), antecedents of informal learning (RQ2), informal learning outcomes (RQ3), and differences between beginning and experienced teachers' informal learning (RQ4). In a final step, the paragraphs assigned to each theme were analyzed to pull out the informal learning activities, the antecedents, and the learning outcomes that were identified by the studies, and to describe the differences between beginning and experienced teachers.

Several steps were undertaken to answer the first research question, which focused on the development of a typology. This research question was answered by a qualitative content analysis, the first step of which was inventorying all learning activities identified in each study. Secondly, the categories proposed in the studies themselves were also inventoried. The categories obtained in these two steps were combined to yield the final categories. Next, the authors discussed the categories and their classification until a consensus was reached and one joint classification was established. Subsequently, eight other researchers with knowledge of the field of professional learning—half of whom also had experience as a teacher in primary or secondary education—were invited to classify the learning activities within the different proposed categories, which included the option, “other.” These raters also had the opportunity to provide suggestions about the categories. The inter-rater reliability of the different classifications (by the eight researchers and the joint classification by the authors) was calculated using Krippendorff's alpha (Krippendorff, 2011).

The second and third research questions were answered by means of a qualitative content analysis of the coded paragraphs. To answer the fourth research question, the information derived from studies that explicitly investigated differences in informal learning between beginning and experienced teachers was supplemented with a comparison of the

frequency and content of the coded paragraphs of articles that solely investigated beginning teachers and those that solely investigated experienced teachers. In order to answer this final research question, studies were categorized according to the years of experience of the teachers in their samples. Three categories were formed: studies focusing on beginning teachers (up to three years of experience), studies focusing on more experienced teachers (more than three years of experience), and studies including multiple levels of experience.

Results

General Characteristics of the Reviewed Studies

All of the selected studies acknowledged the importance of informal learning within the context of teacher learning and practice, regardless of their specific results (e.g., Lohman & Woolf, 2001; Rytivaara & Kershner, 2012; Shapiro, 2003; Van Daal, Donche, & De Maeyer, 2014; Williams, 2003). In general, we were able to distinguish five reasons given in the literature for why it is important to investigate informal teacher learning. The authors of the studies argued that teacher learning within the workplace (a) is important within the context of school reform or the implementation of an innovation or new teaching method (e.g., Bakkenes et al., 2010; Henze, Van Driel, & Verloop, 2009; Hoekstra & Korthagen, 2011; Lewin, Scrimshaw, Somekh, & Haldane, 2009; Van Eekelen, Vermunt, & Boshuizen, 2006); (b) is crucial for the quality of student/pupil learning (e.g., Armour & Yelling, 2007; Burn, Mutton, & Hagger, 2010; Cameron, Mulholland, & Branson, 2013; McCormack, Gore, & Thomas, 2006; Nawab, 2011); (c) plays an important role in teacher retention (e.g., Patrick, Elliot, Hulme, & McPhee, 2010; Shanks, Robson, & Gray, 2012); (d) merits attention because the pressure on teachers is increasing (e.g., Clement & Vandenberghe, 2000; Jurasaitė-Harbison, 2010; Kwakman, 2001; Lohman, 2000); and (e) reflects a growing awareness that what has been learned in formal professional development initiatives is, for

various reasons, insufficiently transferred to the daily practice of teaching (e.g., Burns, 2008; Fraser, 2010; Hoekstra et al., 2007; Jurasaitė-Harbison, 2009; Poulson & Avramidis, 2003).

As previously mentioned, 74 studies were included in the analysis. Of these studies the great majority applied qualitative research methods ($n = 46$), with semi-structured interviews as the most common way of collecting data (e.g., Appova, 2009; Ben-Peretz, 2002; Fox, Deaney, & Wilson, 2010; Lisahunter, Rossi, Tinning, Flanagan, & MacDonald, 2011), although several authors also conducted intensive case studies (e.g., Cedefop, 2007; Clement & Vandenberghe, 2001; Hoekstra, Brekelmans, et al., 2009; Jurasaitė-Harbison, 2008; Nawab, 2011). Of the remaining studies, 15 applied a mixed-method approach, usually combining a quantitative survey and interviews (e.g., Desimone et al., 2014; Dunn & Shriner, 1999; Kwakman, 2003; Maaranen, Kynäslähti, & Krokfors, 2008). However, the majority of the mixed-method studies emphasized the qualitative data (e.g., Fraser, 2010; Meirink, Meijer, Verloop, & Bergen, 2009a; Wilson & Demetriou, 2007). Only 13 studies applied quantitative research methods; in these, data were collected using a survey (e.g., Burns, Schaefer, & Hayden, 2005; Kwakman, 1998; Lohman, 2006; Pedder, 2007; Smaller, Clark, Hart, Livingstone, & Noormohamed, 2000; Smaller, Hart, Clarke, & Livingstone, 2001). As a group, the studies indicate that research on informal teacher learning is primarily qualitative.

The studies were also categorized according to the students' education level, recognizing that there were studies from several different countries (e.g., the US, The Netherlands, Pakistan, Australia, the UK, Portugal) that have different educational systems and use different terms for the different levels of education. We distinguished between elementary and secondary education based on whether teachers were grade-level or subject-specific teachers. Elementary education describes the level of education after kindergarten where teachers usually teach multiple subjects within one grade (i.e., grade-level teachers).

For example, in the US, elementary education encompasses Grades 1 to 5, and in most of Western Europe (e.g., The Netherlands, Belgium), pupils are taught by grade-level teachers from Grades 1 to 6.

Secondary education refers to the level of education where teachers teach specific subjects to different classes. Typically, this level of education refers to Grades 7 to 12 in most of Western Europe and to Grade 9 onward in the United States. Using this categorization, the majority of the selected studies ($n = 41$) focused on teachers from secondary education, 19 studies included teachers from both secondary and elementary education, and only 11 studies focused solely on teacher learning within elementary education. The remaining three studies did not specify the level of education that was investigated. Some of the studies ($n = 8$) focused on teachers of specific subjects, namely science, mathematics, and physical education (e.g., Richter et al., 2011; Melville & Wallace, 2007; Pissanos & Allison, 1996; Winchester, Culver, & Camiré, 2013). However, we identified no major differences in everyday teacher learning among teachers from different subjects, with the exception of physical education teachers, especially those within elementary education, as physical education teachers' daily practice differs from that of their colleagues who are teaching one class and grade (e.g., Pissanos & Allison, 1996; Winchester et al., 2013). Physical education teachers struggle with the fact that their teaching schedule differs from their colleagues and, as a consequence, they rarely have non-teaching periods at the same time as their colleagues (Winchester et al., 2013). In addition, they often struggle with a lack of appreciation for their subject (Pissanos & Allison, 1996). Where relevant, these differences will be discussed in the following sections.

Informal Learning Activities

As expected, the majority of the studies ($n = 53$; 71.62%) focused on identifying the activities from which teachers learn while executing their job. In total, 371 non-unique

learning activities were inventoried by the authors, which were reduced to 129 unique learning activities. However, five learning activities were excluded from further analyses because they are not a part of the everyday teaching practice: “listening to presentation of experts” (Meirink, Meijer, & Verloop, 2007), “attending professional conferences” (Henze et al., 2009; Lohman & Woolf, 2001), “learning through non-teaching jobs” (Shapiro, 2003), “experiencing computer simulations” (Henze et al., 2009), and “role playing” (Lohman, 2000). Hence the analysis was continued with 124 learning activities. The 10 most frequently identified activities are reported in Table 2. Twenty Categories for organizing the learning activities were also proposed in some of the studies; Table 3 gives the 20 categories which were thus identified. Based on these 20 categories and the initial classification of the learning activities by the authors, seven categories, two of which had two subcategories each, were proposed for the typology.

The first category in the typology is Interaction and Discussion with Others; it has two subcategories, Collaboration and Sharing. Teachers’ colleagues play a prominent role in both subcategories. Several studies identified Collaboration as a learning activity, and the majority of studies indicate that this collaboration occurs with colleagues, but do not describe the collaboration process. Activities such as discussion, joint work, meetings, and mentoring are also included in this subcategory. The second subcategory, Sharing, involves sharing information (e.g., tips, insights, ideas) as well as materials and practices. The second category, Practicing and Testing, also has two subcategories, Learning from Doing or Experiencing and Experimenting. Learning from Doing or Experiencing encompasses teachers’ learning from the daily activities that form the core of their curricular activities. Experimenting focuses on trying and implementing novel things.

The third category includes activities in which teachers learn from others but do not interact with them. Learning from Others Without Interaction is made up of activities such as

observation or getting ideas and feedback from others. Category four focuses on activities that are undertaken individually. Consulting Information Sources includes reading professional literature as the most cited activity, as well as consulting social and other media. The fifth category, Reflection in and on Action, focuses on the mental activities involved when teachers analyze or think about various aspects of their practice or profession. In addition to their daily involvement with the curriculum, teachers are often involved in various Extracurricular Activities, the sixth category. This category includes activities such as being on committees, managing duties and being involved in networks outside of the school that are not specifically designed for supporting teacher learning. The seventh category is labeled Encountering Difficulties, as teachers may also react and learn when things do not go as planned or desired.

Subsequently, eight other researchers classified the learning activities using the proposed categories. The inter-rater reliability for the nine ratings (eight by external researchers and the combined ratings of the authors) was unacceptable, with a Krippendorff's alpha of .60. Based on the raters' suggestions, we collapsed the two subcategories of Interaction and Discussion, which resulted in higher inter-rater agreement (Krippendorff's alpha = .66). Next, the results of the classifications of each learning activity were explored. For 60 learning activities, all raters were completely in agreement, for 14 learning activities, only one rater indicated a different category, and for eight learning activities two raters indicated a different category. For the 22 learning activities where raters differed, the classification that was proposed by the majority of researchers was selected for the final categorization. The authors discussed the classification of the remaining 42 activities until a clear consensus was reached. The final categorization of the learning activities is presented in Table 4.

Antecedents of Informal Learning

The second research question was aimed at exploring factors that preceded informal teacher learning. Both inhibiting and facilitating factors were identified (Ellström & Kock, 2011; Hicks et al., 2007). On the one hand, inhibiting factors impede learning—that is, learning cannot start, the learning process is interrupted, or learning is terminated too early (Hicks et al., 2007). Facilitating factors, on the other hand, enable learning (Ellström & Kock, 2011). Often, the presence or absence of certain factors indicates the facilitating or inhibiting aspect of the antecedent.

In total, 54 of the selected studies (72.97%) acknowledged a possible antecedent for informal teacher learning. Similar to the analysis related to learning activities, the antecedents identified in all studies were inventoried. Then, the antecedents were categorized across the three levels identified by Baert et al. (2006) and applied by Kyndt and Baert (2013) in their systematic review on work-related learning: individual characteristics, job characteristics, and school and broader context. One category used by Kyndt and Baert, that is, characteristics of the learning activity, was not included in this study as it pertains to aspects of the instructional design or outcomes of formal learning activities. This category was modified in this study to fit the context of informal learning; it includes specific prerequisite characteristics of the learning content. An overview of 92 identified antecedents can be found in Table 5. We will only discuss the most frequently identified antecedents. In addition, the categorization might suggest that these antecedents operate independently from each other. However, teachers work within contexts, and the different antecedents are inevitably interwoven. The personal characteristics of seniority, career stage and teacher age, which were also identified as antecedents, will not be discussed in this section, as our final research question is focused on beginning versus more experienced teachers.

At an *individual level*, teachers' willingness to learn and improve their practice takes a central place and can be considered a necessary condition for learning to occur (e.g.,

Collinson & Cook, 2004; Rytivaara & Kershner, 2010; Van Eekelen et al., 2006). If a teacher does not want to learn, does not see the need to learn, and is resistant to new teaching methods, learning contents, and wider reforms, little learning will occur (e.g., Cameron et al., 2013; Van Eekelen et al., 2006), even if the context offers a wide range of opportunities. In contrast, positive attitudes and dispositions or a more general love of learning will lead to engagement in several learning activities (e.g., Burn et al., 2010; Hodkinson & Hodkinson, 2004; Lohman, 2006, 2007). The ways in which active teachers look for learning opportunities and the type of learning activities they choose are related to several facets of their personality, among other things. The reviewed studies show that proactivity, openness, and extraversion, or an outgoing personality, are related to undertaking various learning activities (e.g., Fox et al., 2010; Jurasaitė-Harbison, 2008; Lohman, 2005; Maaranen et al., 2008). In terms of the learning content, teachers were especially motivated to acquire knowledge and skills that were practical, relevant, useful, and meaningful for their own classroom (e.g., Armour & Yelling, 2007; Cameron et al., 2013; Retallick, 1999; Scribner, 1999). However, they also read more general and theoretical literature (Poulson & Avrimidis, 2003).

Regarding the *job characteristics* of the teaching profession, an interesting tension between autonomy and collegiality was identified by Clement and Vandenberghe (2000, 2001). Teachers value their autonomy and appreciate being able to organize their classroom and teaching as they choose, giving them the freedom to experiment in their own classrooms, an important learning activity (e.g., Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009; Van Eekelen et al., 2006). However, unsolicited sharing and observation, which might also result in learning opportunities, are not always appreciated, especially when these activities are perceived as a threat to autonomy (e.g., Collinson & Cook, 2004; Jurasaitė-Harbison, 2009). This concern is illustrated by teachers' statements, such as “they don't have

to tell me what to do in my own classroom.” In addition, collegiality and good social and professional relationships are also important and positively related to informal learning (e.g., Jurasaitė-Harbison & Rex, 2010; Patrick et al., 2010). However, not all studies paint this positive picture; rather, several studies identified unsupportive, superficial, negatively colored, and limited collegial relationships among colleagues (Clement & Vandenberghe, 2000; Flores, 2005).

Clement and Vandenberghe (2000, 2001) discussed these contrasting results. According to them, collegiality and respect for teachers’ autonomy and vice versa are both beneficial for learning. In addition, the high level of autonomy that teachers report and also appreciate has its drawbacks as well. Several teachers report that the teaching profession can be lonely, and that both professional and geographic isolation are detrimental to their informal learning (e.g., Dehli & Fumia, 2008; Jurasaitė-Harbison, 2009; Williams, 2003). A lack of proximity to colleagues (especially teachers of the same subject or same grade) inhibits informal learning, because fewer informal encounters, talks, discussions, opportunities for sharing, and collaborations between colleagues can occur (e.g., Desimone et al., 2014; Lohman, 2000; Lohman & Woolf, 2001). Therefore, it is not surprising that the presence of a common room (i.e., staff room, lunch room, teachers’ lounge, etc.) is highly appreciated as a space for learning because it provides a place for these interactions to occur (e.g., Lisahunter et al., 2011; Mawhinney, 2010). On a more structural level, a lack of full-time employment and limited career opportunities due to the horizontal nature of the profession and the scarcity of middle-management positions were also identified as inhibiting factors for informal learning (Patrick et al., 2010).

Most of the antecedents identified in the reviewed studies could be situated at the level of the *school context*; references to the broader context were limited (e.g., Hodkinson & Hodkinson, 2005; Nawab, 2010; Pissanos & Allison, 1996; Retallick, 1999). More

specifically, several authors focused on the role of the school culture or social support within schools, which for some authors was an inherent element of school culture. School culture can be defined as “the beliefs, values, habits and assumed ways of doing things among communities of teachers who have had to deal with similar demands and constraints over many years” (Hargreaves in Flores, 2004, p. 299). In general, results show that a collaborative school culture that values, appreciates, and stimulates all forms of collaboration among teachers comes to the fore as the most desirable for the occurrence of informal learning (e.g., Cameron et al., 2013; Jurasaitė-Harbison & Rex, 2010; McCormack et al., 2006). In addition, teachers value social support from different sources (i.e., colleagues, principal, management, administration, etc.) for their informal learning. However, as mentioned, not all studies reported the presence of such supportive and collaborative school environments (e.g., Flores, 2005; Jurasaitė-Harbison, 2009). Furthermore, several authors reported on the dominant norms, values, and traditions within schools and how they influence learning. Many teachers stated that it is important to understand these norms (e.g., Christensen, 2013). Unfortunately, even when these norms do not enhance informal learning, new teachers often go through a process of adapting to the dominant culture rather than initiating a change (e.g., Flores, 2004).

School leaders also play an important role for teachers' informal learning that occurs within their schools. First of all, they have a major influence on the school culture (e.g., Jurasaitė-Harbison & Rex, 2010) and various workplace conditions (e.g., Clement & Vandenberghe, 2001; Flores, 2005; Jurasaitė-Harbison & Rex, 2010; Scribner, 1999). Moreover, they are an important source of information and feedback for certain teachers (e.g., Jurasaitė-Harbison & Rex, 2010; Nawab, 2010). In addition, school leaders have been called upon to move beyond administrative leadership and to inspire and support teachers (Clement & Vandenberghe, 2001).

The issue of a lack of reward came to the fore in several studies, in the form of both monetary reward and recognition and appreciation as a reward for learning and improving practice. In terms of monetary rewards, the results were limited and inconsistent; some studies indicated that monetary rewards could be a good incentive for teacher learning. However, monetary reward was not a crucial factor for enhancing learning (e.g., Lohman, 2000, 2005, 2006). Appreciation and recognition from school leaders, colleagues, and students were deemed more important for teachers (e.g., Lohman, 2005; Retallick, 1999; Wilson & Demetriou, 2007).

The final antecedent to be discussed concerns time to learn. In general, teachers reported that a lack of time inhibits their learning (e.g., Ben-Peretz, 2002; Mawhinney, 2010; Retallick, 1999). More specifically, teachers would appreciate more joint non-teaching time, especially together with colleagues teaching the same subject or grade (e.g., Christensen, 2013; Jurasaitė-Harbison & Rex, 2010; Nawab, 2010). Furthermore, teachers reported that it would be important to have the freedom to decide for themselves how they could use this joint non-teaching time (e.g., Lohman, 2000, 2005).

Informal Learning Outcomes

Compared to what was seen for the first two research questions, fewer studies ($n = 20$; 27.03%) examined the learning outcomes of informal teacher learning (e.g., Flores, 2005; Kang & Cheng, 2014; Meirink et al., 2007; Verbergh, Tigelaar, & Verloop, 2013). Furthermore, not all of these studies investigated these learning outcomes in detail. For our analysis, all studies making reference to a learning outcome were included, even if these outcomes were not the main focus of the study.

We earlier defined learning outcomes as sustainable changes in knowledge, skills, or attitudes as a result of engaging in learning activities (Doyle et al., 2008; Matthews, 1999). In the studies included in this review, participants were primarily asked what they had

learned from their daily practice as a teacher. This resulted in a whole range of learning outcomes, ranging from very specific outcomes, such as a specific technical skill (Van Eekelen et al., 2006), to very holistic outcomes, such as developing a teacher identity (McNally et al., 2009). Teachers' learning outcomes can be situated within three main areas: subject knowledge, pedagogical knowledge and skills, and professional attitudes and identity.

Subject knowledge. In seven out of the 20 studies, teachers indicated that they acquired knowledge about the subject(s) they teach through informal learning activities (Flores, 2005; Fraser, 2010; Henze et al., 2009; Scribner, 1999; Shapiro, 2003; Van Eekelen et al., 2006; Verbergh et al., 2013). The study by Henze et al. (2009) identified reading professional literature and using multimedia as important learning activities in acquiring more subject knowledge. Fraser (2010) stated that informal learning was used to address gaps in subject knowledge after formal education.

Pedagogical knowledge and skills. Most of the studies reporting informal learning outcomes included learning outcomes that were pedagogical in nature ($n = 13$). On a general level, several studies reported that teachers learned teaching skills (e.g., Flores, 2005; Kang & Cheng, 2013; Shapiro, 2003) and new teaching methods (e.g., Henze et al., 2009; Hoekstra, Brekelmans, et al., 2009; Kang & Cheng, 2009; Meirink et al., 2007) through various informal learning activities, such as experimenting, sharing ideas, and collaborating with colleagues (Henze et al., 2009). Instrumental pedagogical skills were also acquired, such as classroom management strategies (e.g., Burns & Schaefer, 2003; Kang & Cheng, 2013; McCormack et al., 2006; Scribner, 1999), and more specifically, how to maintain discipline (Burns, 2008; Burns et al., 2005). Other instrumental skills included dealing with paperwork (e.g., Burns, 2008; Burns et al., 2005; Burns & Schaefer, 2003), using multimedia (e.g., Burns, 2008; Burns et al., 2005), handling equipment (e.g., Burns, 2008; Burns et al.,

2005; Burns & Schaefer, 2003), preparation and planning (e.g., Burns & Schaefer, 2003), and designing instructional programs (e.g., McCormack et al., 2006).

A final category of pedagogical skills was related to teachers' emotional wellbeing (Burns & Schaefer, 2003), enabling them to alleviate stress and strain, handle the workload, set realistic goals, deal with difficult situations and decisions, and motivate themselves (Burns & Schaefer, 2003; Flores, 2005; Hoekstra & Korthagen, 2011).

Professional attitudes and identity. The learning outcomes under this heading can be considered to be more holistic than those already discussed. Some studies remained rather vague, stating that teachers acquired the competence to display professional or social behavior (e.g., Burns, 2008; Burns et al., 2005; Hoekstra & Korthagen, 2011; Van Eekelen et al., 2006) and reached a better understanding of their profession (Verbergh et al., 2013). Teachers also reported that they formed their teacher identity (e.g., Hodkinson & Hodkinson, 2005; McCormack et al., 2006; McNally et al., 2009) and learned more about themselves as individuals (McNally et al., 2009) throughout their career and daily learning experiences. An increase in self-confidence was also related to informal learning activities (e.g., Henze et al., 2009; McCormack et al., 2006; Verbergh et al., 2013), as was improved awareness about teachers' own behavior, their students' behavior, and the reasons behind those behaviors (e.g., Flores, 2005; Hoekstra & Korthagen, 2011; McNally et al., 2009; Scribner, 1999; Verbergh et al., 2013). The study by Verbergh et al. (2013) also illustrated how some teachers became role models for their pupils.

Furthermore, teachers indicated that they had to learn about the politics within schools and in the broader school context. Teachers learned about the implicit and unwritten rules, the (micro-)political climate, the power bases and how to navigate among them (Burns & Schaefer, 2003; Christensen, 2013; Flores, 2004; McCormack et al., 2006). This type of learning entails a strategic component, in a sense, insofar as teachers learn how to use the

political structures within the school, but Flores (2004) stated that this learning often involved adapting to the dominant culture. Finally, several authors focused on changes in teachers' cognitions, beliefs, and conceptions of teaching (e.g., Hoekstra, Brekelmans, et al., 2009; Meirink et al., 2007, Meirink, Meijer, Verloop, & Bergen, 2009b) or even a changed vision of education (Verbergh et al., 2013).

Differences between Beginning and Experienced Teachers

The fourth research question focuses on potential differences between beginning and more experienced teachers. In line with a number of empirical studies (e.g., Bakkenes et al., 2010; Burns, 2008; Flores, 2004; Lohman, 2000), a distinction was made between teachers with up to three years of experience and those with more years of experience. In addition, this cut-off point is in line with the different developmental models that were described in the theoretical background, which depict a beginning teacher as a teacher with up to three years of experience (Huberman, 1993; Rolls & Plauborg, 2009; Tickle, 1994). The majority of the selected studies investigated teachers from all levels of experience ($n = 35$; 47.30%). Within some of these studies, attention was given to differences between beginning and more experienced teachers ($n = 10$). Furthermore, 17 studies (22.97%) focused specifically on beginning teachers and 22 studies (29.73%) focused just on teachers with at least three years of experience as a teacher.

Learning activities. Based on the inventories that were done for the prior three research questions, it was possible to compare the learning activities, antecedents, and learning outcomes from studies focusing solely on beginning teachers to those from studies investigating only teachers with more than three years of experience. Based on the comparison of these studies, it can be concluded that differences in terms of learning activities are limited. Both types of study report learning activities from the categories “Collaboration,” “Learning by Doing,” “Experimenting,” “Learning from Others Without

Interaction,” and “Reflection.” Neither type of study reported activities from the categories “Extracurricular Activities” and “Encountering Difficulties.” The only difference found when comparing these studies was that studies focusing on more experienced teachers reported learning activities from the category “Sharing,” in contrast to studies examining beginning teachers (e.g., Collinson & Cook, 2004; Henze et al., 2009; Lohman, 2000; Lohman & Woolf, 2001; Noonan, 2013). However, this finding is in contrast with the finding of Flores (2005), stating that novice teachers attribute more importance to sharing.

Studies that compared beginning and more experienced teachers within the same study revealed additional findings related to informal learning activities. More experienced teachers reported less learning through experimenting, including trial and error (Flores, 2005; Van Daal et al., 2014) and through collaboration (Richter et al., 2011). In contrast, they did engage more often in reading professional literature (Flores, 2005; Richter et al., 2011) in comparison with beginning teachers. Furthermore, novice teachers learned more through observing colleagues (Flores, 2005) and interactions with their (informal) mentor (Mawhinney, 2010; Patrick et al., 2010). However, Patrick et al. (2010) also acknowledged that more experienced teachers learn from engaging with novices while mentoring them. The literature is in disagreement about who engages more in learning activities. Van Daal et al. (2014) concluded that more experienced teachers seem to participate less in workplace learning. In contrast, Richter et al. (2011) argued that older teachers invest the same time in professional development but prefer different learning activities. Cameron et al. (2013) added that more experienced teachers are more selective in the learning opportunities they take on. Richter et al. (2011) concluded that there is a curvilinear relationship between age and the uptake of learning activities (with a maximum at around 42 years old), and that from mid-career onward there is reduced involvement in professional learning due to a reduced need for information and knowledge. Clement and Vandenberghe (2000, p. 94) also

concluded that professional learning occurs less often as the teacher's career progresses, and stated that “after a first, very challenging period, a phase follows in which professional development is not so evident.”

Antecedents. The comparison of the studies investigating beginning teachers with those studies focusing on more experienced teachers did not reveal much information regarding different experiences of the antecedents of informal learning. One initial observation is that no factors situated outside of their school were reported in studies of beginning teachers. Secondly, having a mentor was a more prominent research topic when examining beginning teachers' informal learning (e.g., Desimone et al. 2014; Patrick et al., 2014). Thirdly, isolation as a hindering factor was more frequently reported in studies focusing on beginning teachers (e.g., Burn et al., 2010; Flores, 2004).

Studies comparing beginning and more experienced teachers reported overall that beginning teachers demonstrated a greater need for professional development as well as higher motivation and eagerness for learning than more experienced teachers (Appova, 2009; Cameron et al., 2009; Flores, 2005; Richter et al., 2011). Nawab (2010) also reported that some experienced teachers in Pakistan believed that they had mastered the required skills and therefore did not feel the need for further improvement. According to Richter et al. (2011), work engagement was an important predictor for engaging in learning activities, although its predictive value decreased with age.

Beginning teachers more often reported that unsupportive school and classroom conditions, such as isolation, lack of support and guidance, and ineffective leadership hindered their learning. Nawab (2010) added that beginning teachers often lack the capacity to influence these workplace conditions. In contrast, experienced teachers did not seem to experience these conditions as an obstacle to their learning (Flores, 2005). Finally, Nawab (2010) reported a specific cultural value in Pakistan that hindered the learning processes of

beginning teachers; informal learning was hindered because it is considered inappropriate to disagree with seniors, making in-depth discussion about teaching difficult. On a practical level, Patrick et al. (2010) reported that the lack of a full-time position hindered some beginning teachers' informal learning.

Learning outcomes. Several differences come to the fore when comparing the reported learning outcomes of beginning and more experienced teachers. Studies focusing on beginning teachers primarily reported that beginning teachers learn to understand school politics. They learn about the distribution of power, unwritten rules, and how to navigate within the professional community (e.g., Christensen, 2013; Flores, 2004; McCormack et al., 2006). In addition, learning practical skills, especially in terms of classroom management strategies and handling of discipline, takes a central place within the learning process of beginning teachers (e.g., Burns, 2008; Burns et al., 2005). In contrast, the learning outcomes reported in studies with more experienced teachers mainly concerned learning new teaching methods (e.g., Henze et al., 2009), as well as changing (often conservative) beliefs and conceptions about teaching (e.g., Hoekstra, Brekelmans, et al., 2009; Hoekstra & Korthagen, 2011; Meirink et al., 2007, 2009b).

In terms of learning outcomes, it can be concluded that beginning and more experienced teachers have different needs (Appova, 2009; Flores, 2005; Retallick, 1999). The studies by Appova (2009) and Retallick (1999) added that beginning teachers mainly learn skills and knowledge that are relevant for their own classroom, whereas more experienced teachers are able to make connections between their classroom and the wider context. Overall, beginning teachers are more directed toward pragmatic learning outcomes (Flores, 2005).

Discussion

Based on the empirical research described in the reviewed studies and the classification of the learning activities by multiple researchers, we were able to distinguish nine types of informal learning activities teachers undertake in their daily practice. These learning activities can be divided into learning activities involving other people, such as “Collaboration,” “Learning from Others Without Interaction,” “Sharing,” and “Extracurricular Activities”, and activities that a teacher can undertake individually, such as “Learning by Doing,” “Experimenting,” “Consulting Information Sources,” “Reflection,” and “Encountering Difficulties.” It is important to note that some of the selected studies (e.g., Meirink et al., 2007; Van Eekelen et al., 2006) stressed that that learning activities rarely occur separately from each other. Teachers learn from the interplay between individual activities and those involving others.

Similar to the review on work-related learning across different professions (Kyndt & Baert, 2013), this study identified a large number of *antecedents* for informal learning. Antecedents such as organizational support, motivation, self-efficacy, and autonomy are central to employee learning (both formal and informal) across different professions (e.g., Flores, 2005; Jurasaitė-Harbison, 2009; Kyndt & Baert, 2013; Van Eekelen et al., 2006). However, within this discussion we want to focus on some characteristics that appear to be specific to the teaching profession. Insight into the specific informal learning activities teachers undertake and their context-specific antecedents can inform teachers, teacher training institutes and policy makers about how to foster teachers’ informal learning. The horizontal nature of the teaching profession with few middle-management positions and few promotion opportunities is the first issue that deserves attention. When looking at the antecedents of employee learning across professions, it can be concluded that career mobility plays an important role for employee learning at both the individual (e.g., career exploration, self-directedness in career processes) and organizational levels (e.g., promotion

opportunities). Antecedents related to career mobility were consistently identified, and their presence enhances learning (Kyndt & Baert, 2013). Therefore, it should not be surprising that the lack of these career opportunities, which is a reality for the majority of teachers due to the structure of their profession, inhibits teacher learning (Patrick et al., 2010). In addition, beginning teachers often start their careers with a part-time position or a position spread across different schools. Patrick et al. (2010) identified this lack of a full-time position as an inhibiting factor. However, our results on the importance of getting to know the school culture and politics, as well as the importance of joint non-teaching time with colleagues, may explain this finding, as the lack of a full-time position at one school seems to be related to the fact that beginning teachers can have a less consistent presence in schools, making it difficult for the other antecedents to occur.

The difficulty of grasping informal *learning outcomes* has been a critical issue within the literature on informal learning. In line with the proposition that informal learning outcomes are workplace-specific and often unpredictable, we examined whether the research is able to identify informal learning outcomes when focusing on one specific context. It seems that this approach is indeed able to reveal interesting findings, as the studies identified multiple learning outcomes related to subject knowledge, pedagogical knowledge and skills, and professional attitudes and identity.

Furthermore, the current study added to the body of knowledge about teachers' learning throughout their careers. In line with the theoretical developmental models, our study showed that beginning teachers are eager to learn (e.g., Huberman, 1993; Rolls & Plauborg, 2009; Tickle, 1994) and are concerned with how to handle pupil behaviors (e.g., Huberman, 1993; Rolls & Plauborg, 2009). This study also showed that beginning teachers are indeed oriented towards learning classroom management skills and attitudes, but this extends to different types of practical and pragmatic skills such as planning and completing

administrative tasks. Regarding more experienced teachers, we found that they seemed more oriented towards learning new teaching methods, although beginning teachers also learn more about teaching methods. Rolls and Plauborg (2009) stated that mid-career teachers refine and diversify their instructional techniques, although the authors added that these teachers refine and diversify these techniques through experimentation. The empirical research included in this review found that beginning teachers experiment more than their more experienced colleagues (e.g., Flores, 2005; Van Daal et al., 2014). Our results did concur with the theoretical background as far as the confidence more experienced teachers feel regarding their teaching ability. Although this confidence relates positively to reduced levels of stress, which is good, it does not always enhance teacher learning (e.g., Nawab, 2010; Rolls & Plauborgh, 2009). More experienced teachers have less need for professional development because they feel they have already acquired the necessary skills (Appova, 2009; Cameron et al., 2009; Flores, 2005; Nawab, 2010). However, in an era of continuous change and lifelong learning, this attitude seems outdated. On a more positive note, more experienced teachers learn more than their starting colleagues in a holistic manner. They do not take an isolated view of their classroom as many beginning teachers do; rather, they make relations and connections with the wider context (Appova, 2009; Retallick, 1999). In sum, the main difference between beginning and more experienced teachers does not necessarily lie in the types of learning activities they undertake, although some small differences were identified with regard to experimentation and reading literature. They differ primarily in terms of attitudes towards learning, the outcomes of learning, and how they are influenced by their context. More specifically, beginning teachers' learning is more hindered by unsupportive workplace conditions, while at the same time they lack the power to change these conditions (Flores, 2005; Nawab, 2010). In addition, at a general level more

experienced teachers seem to learn less and are less motivated to learn within their daily practice (e.g., Appova, 2009; Richter et al., 2011).

The number of studies that we classified as focusing on more experienced teachers ($n = 22$), compared to 17 studies focusing on beginning teachers, might give the reader the false impression that our sample contradicts the statement by Rolls and Plauborgh (2009) that few studies have focused on teachers in their mid-career stage. However, the difference in studies is entirely explained by the cut-off point that was chosen (i.e., more than three years of experience) and the fact that the developmental models are more fine-grained than our analysis. Based on the 78 selected studies, we can agree with Rolls and Plauborgh's (2009) observation that only a very limited number of studies focus on teachers who can be considered in to be mid-career with many years of teaching experience. Finally, it can be observed that the studies including all levels of experience (and comparing them) revealed more differences than the comparison of studies focusing specifically on a particular level of experience, because these broader studies examined teachers from different career stages where the difference in experience was (often) more than three years (e.g., Flores, 2005; Richter et al., 2011).

Finally, during the selection process, it became obvious that research on teacher learning is closely related to research on teacher identity (e.g., Akkerman & Meijer, 2011; Friesen & Besley, 2013), formally organized communities of practice or networks (e.g., Chang, Chen, & Li, 2008; Sun, Garrison, Larson, & Frank, 2014; Wang & Lu, 2012), and teacher induction (e.g., Anthony, Haigh, & Kane, 2011; Bickmore & Bickmore, 2010). Research focusing entirely on these topics was not selected, as the primary focus of this study was on everyday teacher learning. However, it is not surprising that these topics arose within this review. In general, our results showed that teacher identity is one of the outcomes of informal teacher learning (e.g., Hodkinson & Hodkinson, 2005; McNally et al.,

2009), that learning is an inherent element within teacher induction (e.g., Christensen, 2013; Flores, 2004), and that collaboration is at the heart of both teacher learning and their communities of practice (e.g., Anthony et al., 2011; Lohman, 2000).

Limitations

Despite its merits and contributions, the current study faces some limitations that may moderate the impact of the results. First of all, a traditional limitation of systematic reviews is potential publication bias. Although studies from different sources (published and unpublished) were included in the current review, the vast majority of the selected studies were derived from international peer-reviewed journals ($n = 66$; 89.19%). In addition, the majority of the participants in the reviewed studies were volunteers. Therefore, it is possible that they have a more positive attitude toward professional learning compared to the entire population (Lohman & Woolf, 2001). These two issues could yield a more positive picture of teachers' informal learning from this review, compared to the reality of teachers' learning.

Secondly, the current study combines results from studies that were conducted within different countries with different educational systems, policies, and cultures that may impact teacher learning and its antecedents, such as the organization of non-teaching time, workload and the nature of educational reforms and innovations. The current study did not make cross-cultural comparisons, and as Nawab's study (2011) illustrated, informal teacher learning and workplace conditions can differ across countries and cultures. Therefore, it is important to realize that the current study primarily discusses general patterns that were identified across countries, but also that these results were dominated by studies from the United States and Western Europe. It remains important to take the broader societal context into account when examining informal teacher learning, especially when formulating implications for practice.

Furthermore, this study examined outcomes of informal learning that were identified in prior empirical studies. Results showed that learning outcomes could be categorized as

subject knowledge, pedagogical knowledge and skills, and professional attitudes and identity. However, the vast majority of the selected studies relied on self-report measures (e.g., interview, questionnaires) rather than (objective) assessments of learning (see Appendix 3 for details by study). Consequently, caution is needed when generalizing these results.

Finally, the fourth research question of this systematic review aimed to compare beginning and more experienced teachers. Unfortunately, the data from the studies did not allow an investigation of teacher learning throughout the entire teaching career, as not enough studies focusing on specific levels of teaching experience could be identified. However, if we truly consider teaching to be a profession of continuous growth, it would be interesting to consider different learning goals for different career stages.

Future Research Perspectives

Based on the results of the current study, we can offer some perspectives for future research. On a general level, it could be concluded that the area of informal teacher learning has been primarily dominated by the use of qualitative research methods adopting an exploratory approach in which rich and in-depth information was gathered. However, as illustrated by this review, quite a lot is already known about informal teacher learning, especially in terms of learning activities and antecedents. Therefore, it seems appropriate to suggest that the field is ready to move beyond the exploratory approach and to start building coherent theoretical models that are subsequently tested in larger samples to determine whether generalizations can be made. However, as previously mentioned, it will remain important to take the specific context and teacher biographies into account. Therefore, a mixed-method approach seems appropriate. More specifically, we would like to suggest a methodology that was not adopted in any of the reviewed studies, that is, an “equal status sequential” mixed-method design in which the quantitative phase precedes the qualitative phase (Heyvaert et al., 2013). This approach would allow the researcher(s) to develop a

theoretical model based on the extensive research presented above, test the model empirically with a large group of participants, and subsequently discuss the results from this quantitative phase using a qualitative approach with a small (sub)sample of the participants in order to check, refine or explain the results. For example, future research can further examine the interaction and sequences of learning activities and the tension between different antecedents of informal learning, in line with the research by Meirink et al. (2007) and Clement and Vandenberghe (2000),.

Finally, we would like to draw attention to the statement made by Tynjälä (2008) that learning results from the interaction between the individual and the organization. The literature on informal teacher learning acknowledges the existence of both individual as well as organizational antecedents for teacher learning. However, little research has explicitly investigated the interaction between these antecedents. Future research could investigate whether specific individuals learn in specific ways, and could therefore benefit more from specific workplace conditions. For example, certain personality traits could be related to the preference for collaborative learning activities, which could in turn be related to the importance of the presence or absence of a collaborative school culture. Furthermore, it would be interesting to conduct more studies across different professions, such as the studies by Lohman (2005, 2007), in order to gain more insight into what distinguishes informal learning in the teaching profession in comparison with other professions. This information would allow us to investigate whether different occupational groups can learn from one another when it comes to supporting and enhancing professional development.

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Table 1

Overview of Literature Search Hits (June 2012)

Search terms	ERIC	Francis	PsycINFO	SSCI
Teacher & Informal learning	451	64	327	257
+ year limit	344	64	326	257
Teaching staff & Informal learning	5	21	3	17
+ year limit	4	21	3	17
Teacher & Incidental learning	108	17	237	27
+ year limit	58	15	201	27
Teaching staff & Incidental learning	4	2	0	1
+ year limit	3	1	0	1
Teacher & Implicit learning	61	38	205	129
+ year limit	47	36	205	129
Teaching staff & Implicit learning	0	3	0	5
+ year limit	0	3	0	5
Teacher & Everyday learning	191	48	39	215
+ year limit	157	48	38	215
Teaching staff & Everyday learning	1	6	0	15
+ year limit	1	6	0	15
Teacher & Workplace learning	374	36	406	141
+ year limit	352	36	406	141
Teaching staff & Workplace learning	4	15	3	17
+ year limit	4	15	3	17
Teacher & Professional learning	3096	873	1462	2452
+ year limit	2800	854	1459	2446
Teaching staff & Professional learning	36	179	14	202
+ year limit	32	179	14	202
Total	4331	1302	2696	3478
Total 1990 – June 2012	3802	1278	2655	3472
Overall Total				11807
Overall Total 1990 – June 2012				11207

Table 2

Top Ten Most Identified Learning Activities

Learning activities	Number of studies	Percentage of studies (Total: $n = 53$)
Reading professional literature	19	35.85%
Observation	18	33.96%
Collaboration with colleagues	16	30.18%
Reflection	16	30.18%
Learning by doing/through experience	12	22.64%
Browsing internet & social media	11	20.75%
Experimenting	11	20.75%
Trial & error	11	20.75%
Talk with others (unspecified)	9	16.98%
Sharing materials & resources	7	13.21%
Storytelling	7	13.21%

Table 3

Categories for Learning Activities in Reviewed Studies

Suggested category	Reviewed studies
Collaboration	Kwakman, 2003
Collaboration with colleagues and experts	Henze et al., 2009
Considering one's own teaching practice	Hoekstra, Brekelmans et al., 2009
Doing/Experiencing	Henze et al., 2009; Hoekstra, Brekelmans et al., 2009; Van Eekelen et al., 2006
Environmental scanning	Lohman & Woolf, 2001
Experimenting	Henze et al., 2009; Hoekstra, Brekelmans et al., 2009; Kwakman, 2003; Lohman & Woolf, 2001; Meirink et al., 2007
Getting ideas from others	Bakkenes et al., 2010; Hoekstra, Brekelmans et al., 2009
Information gathering	Henze et al., 2009
Instructional practice	Kwakman, 2001
Interacting with students	Henze et al., 2009
Knowledge exchanging	Lohman & Woolf, 2001
Learning by thinking	Van Eekelen et al., 2006
Learning from others, no interaction	Meirink et al., 2007
Learning from others, with interaction	Meirink et al., 2007
Learning in interaction	Van Eekelen et al., 2006
Professional improvement	Kwakman, 2001
Reading	Kwakman, 2003; Van Eekelen et al., 2006
Reflection	Kwakman, 2003; Meirink et al., 2007
Reflection individually	Henze et al., 2009
Task extension	Kwakman, 2001

Table 4

Typology of Empirically Identified Learning Activities

Interacting & discussing with others	Practicing and testing		Learning from others, no interaction	Consulting (offline/online) information sources	Reflecting in/on action	Engaging in extracurricular activities	Encountering difficulties
	<i>Doing/ Experiencing</i>	<i>Experimenting</i>					
Asking help from colleagues (3)	Active dealing with experience (1)	Experimenting with new teaching methods (2)	Getting feedback from colleagues (3)	Browsing internet & social media (11)	Analyzing own beliefs about teaching (1)	Coordinating (1)	Engaging in avoidance behavior (1)
Asking colleagues for advice (5)	Adapting way of teaching to students' needs (1)	Experimenting with colleagues' methods (5)	Getting feedback from students (2)	Getting ideas from media (1)	Analyzing preparation (1)	Counseling pupils (1)	Avoiding learning (1)
Being observed and getting feedback (2)		Experimenting with new method (5)	Getting ideas from students (1)	Doing independent research (1)	Analyzing students' reactions in classroom (1)	Executing non-curricular tasks (5)	Experiencing discrepancy (2)
Brainstorming in group (1)	Constructing lesson materials (4)	Experimenting (11)	Getting ideas from others (1)	Conducting inquiry (4)	Becoming aware of earlier plans to use similar methods in practice (1)	Giving opinion to school management (1)	Struggling not to revert to old practices (1)
Co-planning/co-preparing (2)	Deliberately practicing regular teaching tasks (1)	Experimenting individually (2)	Getting ideas from peers (1)	Learning on their own (1)	Becoming aware and reframing (1)	Joining committees (2)	Struggling with behavior and succeeding (1)
Co-teaching (1)	Deploying what works (1)	Experimenting with peers (1)	Learning from others (2)	Reading (3)	Becoming consciously aware (1)	Using networks outside school (3)	
Collaborating with others (3)	Making didactic preparations (1)	Experimenting with self-invented teaching method (1)	Listening to colleagues (3)	Reading colleagues written reports (1)	Becoming consciously aware and adjusting course of action (1)	Organizing study visits for students (1)	
Collaboration (unspecified) (4)	Helping students learning study skills (1)	Implementing innovation (1)	Observing (18)	Reading newspapers (3)	Considering own practice (3)	Performing management tasks	

Interacting & discussing with others	Practicing and testing		Learning from others, no interaction	Consulting (offline/online) information sources	Reflecting in/on action	Engaging in extracurricular activities	Encountering difficulties
	<i>Doing/ Experiencing</i>	<i>Experimenting</i>					
Collaborating with colleagues (16)	Implicitly acquiring and strengthening a belief (1)	Individually improving teaching (1)	Storytelling (7)	Reading professional literature (19)	Orienting (forethought on how to proceed) (1)	Supervising student teachers (1)	
Discussing (unspecified) (3)	Learning by doing/through experience (12)	Practicing new behavior (2)	Using colleagues' materials in own lessons (1)	Studying subject matter literature (3)	Recognizing own conceptions or shortcomings/good practices (1)		
Discussing teaching practice (4)	Modeling good practices (1)	Testing new materials (1)		Studying teaching manuals (3)	Reflecting on collaboration in study group or own experiments (1)		
Discussing with colleagues (6)	Preparing lessons (3)	Using trial & error (11)		Watching TV & video (e.g., documentaries) (4)	Reflecting (16)		
Discussing with others (2)	Reading student assignments (1)	Trying different things (4)			Reflecting individually (4)		
Giving help (3)	Teaching students study skills (1)				Reflecting on actions (4)		
Interacting with colleagues (6)	Trusting intuitions and feelings (2)				Reflecting on practices & experiences (4)		
Interacting with parents (3)	Unconsciously engaging in learning activities (1)				Reflecting together (1)		
Interacting with students (5)					Reflecting upon students' work (1)		
Interacting with (informal) mentor (1)					Relating/comparing teaching method or theories to own teaching (1)		

Interacting & discussing with others	Practicing and testing		Learning from others, no interaction	Consulting (offline/online) information sources	Reflecting in/on action	Engaging in extracurricular activities	Encountering difficulties
	<i>Doing/ Experiencing</i>	<i>Experimenting</i>					
Interacting with principal (1)					Selecting discussed teaching method suitable for own practice (1)		
Joint working (4)					Self-regulating teacher practice (1)		
Making agreements with colleagues about way of teaching (1)					Valuing an experiment (1)		
Meeting with colleagues (2)					Valuing elements in colleagues' teaching method (1)		
Mentoring/coaching (2)							
Seeking feedback (unspecified from whom) (1)							
Seeking feedback from students (3)							
Sharing (4)							
Sharing (subject) knowledge (4)							
Sharing experiences (5)							
Sharing externally acquired ideas (1)							
Sharing ideas (4)							

Interacting & discussing with others	Practicing and testing		Learning from others, no interaction	Consulting (offline/online) information sources	Reflecting in/on action	Engaging in extracurricular activities	Encountering difficulties
	<i>Doing/ Experiencing</i>	<i>Experimenting</i>					
Sharing ideas about education (2)							
Sharing ideas about pupil counseling (1)							
Sharing information (3)							
Sharing insights / tips (2)							
Sharing instructional practices (4)							
Sharing materials & resources (7)							
Talking with colleagues (2)							
Talking with others (unspecified) (9)							

Note: The number in brackets represents the number of studies that identified this learning activity

Table 5

Overview of Antecedents of Informal Teacher Learning

Individual characteristics	Job characteristics	Learning content	School context	Broader context
Motivation for learning (15)	Autonomy (8)	Practicality (4)	Support (14)	Cultural gender values (2)
Personality (9)	Job demands/workload (6)	Relevance for own teaching (2)	Time (13)	Family life (2)
Seniority/career stage/age (7)	Job control (3)	General & theoretical literature (1)	School culture (12)	Regulations, national policy (2)
Interest (6)	Co-teaching/shared practices (2)	Usefulness for teaching (1)	Collaboration opportunities (11)	Community views on sport (1)
Disposition/attitude toward learning (5)	Job variety (2)		Isolation (11)	Continued association with higher education (1)
Motivation to improve (5)	Limited career path (2)		Leadership (10)	Meetings outside school (1)
Professional attitude (feel obliged to improve practice, responsibility for learning, critical attitude) (5)	Part-time/full-time (2)		Peer support (8)	Society (1)
Awareness (4)	Management responsibilities (2)		School ethos/norms (8)	Personal networks (1)
Self-efficacy (4)	Challenge (1)		Common room (7)	
Emotional reactions (3)			Interaction with colleagues & others (7)	
Initiative (3)			Collegiality (6)	
Love of learning (3)			Proximity to colleagues (6)	
Resistance to change (3)			Recognition/appreciation (6)	
Agency (2)			Social relationships (6)	
Aspiration (goal setting) (2)			Decision making (5)	
Commitment (2)			Non-teaching time + control over it (5)	

Confidence (2)	Trust (5)
Gender (2)	Access to resources (internet, books, etc.) (5)
Proactivity (2)	Community (being part of) (4)
Self-confidence (2)	Informal mentor (4)
Work engagement/commitment (2)	Reactions of other teachers (reciprocity, interest, openness) (4)
Appraisal of feasibility (1)	Accessibility of others (not colleagues) (3)
Attitude toward teamwork (1)	Collaborative culture (3)
Beliefs that sharing is important to learn (1)	Joint non-teaching time (3)
Insecurity & frustration (1)	Monetary reward (3)
Level of competence (1)	Supportive environment (3)
Marital status (1)	Access to computer technology (2)
Maturity (1)	Allocation of funds (2)
Weighing of costs (time & effort) versus own learning gain (1)	Atmosphere (2)
	Collaborative relationship (2)
	Lack of funds (2)
	Openness of culture (2)
	Staff meetings (2)
	Common interest with colleagues (1)
	Common teaching goals (1)
	Interdisciplinary units (1)
	Proximity to department office (1)

Proximity to library (1)
Same subject teachers (1)
Shared responsibility (1)
Team stability (1)
Tension between individual and organizational goals (1)

Note: The number in brackets represents the number of studies that reported that antecedent