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ABSTRACT

Teachers' expertise is mostly based on insights acquired in their own practice, and not on academic knowledge. Although many attempts have been made to explain this, it is not clear which conditions foster and which barriers hinder teachers' use of academic knowledge. Therefore, this review study explores barriers and conditions for teachers' academic knowledge utilisation in the literature since 2001. We have developed a comprehensive model to categorise barriers and conditions at four levels: the research knowledge level, the individual teacher level, the school-organisational level, and the communication level. Our review study reveals that structural collaboration, such as school-university partnerships and innovative communication networks, is increasingly proposed as a strategy to improve teachers' utilisation of academic knowledge.

1. Introduction

Teachers in today's society have to deal with a networked world and with new types of cooperation and collaboration, as well as with new knowledge and new ways of evaluating knowledge. They also need to keep these insights up to date (van Weert, 2006). As Leat and Lin (2003) conclude, due to the rapidly changing society, teachers need to sustain their insights and skills through professional learning and development.

Yet the expertise of teachers is mostly based on insights they have acquired in their own practice, whereas knowledge from educational research hardly plays a role (Hiebert, Gallimore, & Stigler, 2002; Weimer, 2008). Although teachers' practical knowledge and expertise are valuable for everyday classroom practice, new and innovative teaching practices can benefit from educational research. Despite general agreement on the potential of knowledge from educational research to improve educational practices, it is often not used by teachers (e.g. Cain, 2016). This gap between research and practice is commonly acknowledged; researchers claim there is a knowledge base that teachers can use, but the latter experience barriers to access it. Moreover, they find that researchers examine problems that are less relevant for their practice (Lysenko, Abrami, Dagenais, & Janosz, 2014).

Therefore, the knowledge teachers commonly use is of a very different kind from the knowledge that is usually produced by educational researchers in the academic community. Referring to teacher knowledge, Wieser (2016) distinguishes two modes of teacher knowledge, which should be integrated in order to develop expertise: practical knowledge and personal knowledge. Practical knowledge provides teachers with orientations for teaching (Wieser, 2016), and can be characterised as linked with practice, concrete, specific, integrated and contextually rich (Hiebert et al., 2002). Personal knowledge provides teachers with orientations for

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reflection on teaching, and is used for preparing teaching, to justify directions for action, and to correct perspectives (Wieser, 2016). However, for teacher knowledge to become professional knowledge, it is generally agreed that professional knowledge draws on both teachers' practical and personal knowledge, as well as knowledge from research (Lillejord & Børte, 2016).

Contrary to teacher knowledge, academic research knowledge is seen as objective, codified by research, expressed in formalised ways, generalised, impersonal, and generated in order to develop theory (Cain, 2016; Wieser, 2016). Whereas teachers develop expertise by integrating practical and personal knowledge in daily practice (Wieser, 2016), characterised as non-academic (Hemsley-Brown & Sharp, 2003), research knowledge is mostly generated in the academic community and shared with academics in academic journals. In this paper the term academic knowledge is used to refer to this kind of research-generated knowledge.

Although many explanations have been proposed for the research-practice gap or academic-teacher divide, it is not clear which conditions foster and which barriers hinder teachers' use of academic knowledge. Therefore, teachers' lack of utilisation of academic or research-based knowledge continues to be a challenge (Hiebert et al., 2002; Ion & Iucu, 2014).

1.1. Teachers' academic knowledge utilisation

This literature review concerns teachers' academic knowledge utilisation (AKU). The term 'academic knowledge utilisation' refers to teachers' use of research-generated or academic knowledge to ground their teaching practice on research evidence and insights, and therefore does not include practical or personal knowledge from either teachers themselves or their colleagues, or practitioner research conducted by teacher-researchers. AKU is conceptualised as the process of finding, selecting and interpreting academic knowledge, translating knowledge into implications for teaching practice, and applying these implications to their own teaching practice. The last step in this process is sharing this knowledge and experiences by using it with others.

Literature distinguishes between three types of AKU: 1) instrumental, 2) conceptual and 3) strategic research use (e.g. Ion & Iucu, 2014). Instrumental research use implies a concrete application of research, which has often been translated into a material or usable form and is used to direct specific decisions and/or interventions. Conceptual research use is based on research that may change thinking, but not necessarily change particular actions. Strategic research use involves the use of research as a persuasive or political tool to legitimise a position or practice. Because of the aim of this study (improving practice) and of the target group (teachers), it focuses on the instrumental use of academic knowledge.

In 2003, Hemsley-Brown and Sharp (2003) delivered a major contribution to the debate on bridging the gap between research and practice. In their review study on the use of research-based knowledge by teachers, they highlight important factors at different levels for increasing teachers' AKU: accessibility of academic knowledge and a change towards a more practice-based research design, teachers' individual skills and a positive attitude towards academic knowledge, organisational factors (e.g. school leaders) in stimulating and facilitating teachers' AKU, and more and closer communication between teachers and researchers. Since their review many studies have been published on the topic of teachers' AKU. In line with the conclusions of Hemsley-Brown and Sharp (2003) and studies in the following thirteen years, many initiatives have sought to increase teachers' AKU. Despite those initiatives, the gap still exists between research and practice in education.

Therefore, this literature review explores *barriers* and *conditions* for teachers' AKU in secondary education. Based on the results, interventions and strategies will be explored for increasing academic knowledge utilisation by teachers. Two research questions guided our study: 1) Which barriers for teachers' academic knowledge utilisation are described in the literature? and 2) Which conditions are identified that enhance teachers' academic knowledge utilisation?

2. Method

This study was performed in three steps. First, key terms were used to search for relevant articles. Second, relevant articles were selected based on a list of inclusion criteria. Third, the resulting set of articles was analysed with a focus on identifying barriers and conditions for AKU.

2.1. Search

Two databases were used for our search, ERIC and Google scholar. The search was limited to English language peer-reviewed publications published between 2001 and 2016. This starting date was chosen because a similar literature review by Hemsley-Brown and Sharp (2003) on the use of research to improve the practice of teachers included publications until 2001. Their findings are included in this paper, and are summarised at the beginning of each category of barriers and conditions. The search terms used were: *knowledge utilisation* OR *research utilisation*, *knowledge use* OR *research use*, *secondary education* OR *high school* AND *teacher**. The search resulted in 447 papers.

2.2. Selection

The abstracts of these 447 papers were scanned, and relevant papers were selected using as inclusion criteria:

- the paper is published in a peer-reviewed academic journal
- the paper concerns the use of knowledge generated by researchers from the academic community;
- the paper relates to knowledge utilisation by teachers;

- the paper concerns knowledge utilisation in educational setting;
- results are relevant for secondary education;
- the paper includes information about barriers and/or conditions for teachers' use of academic knowledge.

The selection, conducted by the first author, resulted in a selection of 44 papers. In addition, a snowballing technique was applied on the basis of this selection of 44 papers. As a result, 22 relevant papers were added after judging them based on the inclusion criteria. These 22 papers were initially not included because the authors used other key terms, or because the abstracts did not provide full clarity on the scope of the paper. Together with the initial 44 papers, the selection resulted in a set of 66 papers.

As part of a reliability check, a random sample of 20 papers from the 447 papers was checked by the fourth author concerning the inclusion criteria. From these 20 papers, 19 were judged equally by the first and fourth author. One paper was added after discussion, because it involved a related area of knowledge utilisation by teachers (the use of teaching methods based on research knowledge). This did not lead to an adjustment of the selection criteria. In total, 66 papers were analysed (see Appendix A).

2.3. Analysis

The analysis included four steps. First, information about the purpose, methodology, findings and conclusions of the papers was identified and summarised.

The second step was to identify barriers and conditions for teachers' AKU in the findings of the papers.

The third step included the construction of a framework for categorising barriers and conditions for teachers' AKU. This was done by combining categorisations by Cooper, Levin, and Campbell (2009) and Mitton, Adair, McKenzie, Patten, and Perry (2007). Cooper et al. (2009) identify three important elements in linking research to practice, i.e. 1) characteristics of the research knowledge, 2) characteristics of the group at which the knowledge is aimed (schools/teachers), and 3) characteristics of the linkages between researchers and practitioners. A literature review by Mitton et al. (2007) concerning knowledge transfer and exchange in health sciences identifies four categories of barriers and facilitators for knowledge transfer and exchange: 1) individual level, 2) organisational level, 3) aspects related to communication; and 4) aspects related to time. The three elements were combined with the four levels to create our model for analysing barriers and conditions for teachers' AKU. The model is presented in Fig. 1.

Within the model, the research knowledge level includes barriers and conditions related to the research knowledge itself, or to the researchers producing this knowledge. For instance, the accessibility of research knowledge is a commonly acknowledged barrier for teachers' AKU. The school-organisational level concerns barriers and conditions relating to the school in which teachers work, such as facilitation and support for teachers' AKU. The individual teacher level includes barriers and conditions related to the teachers
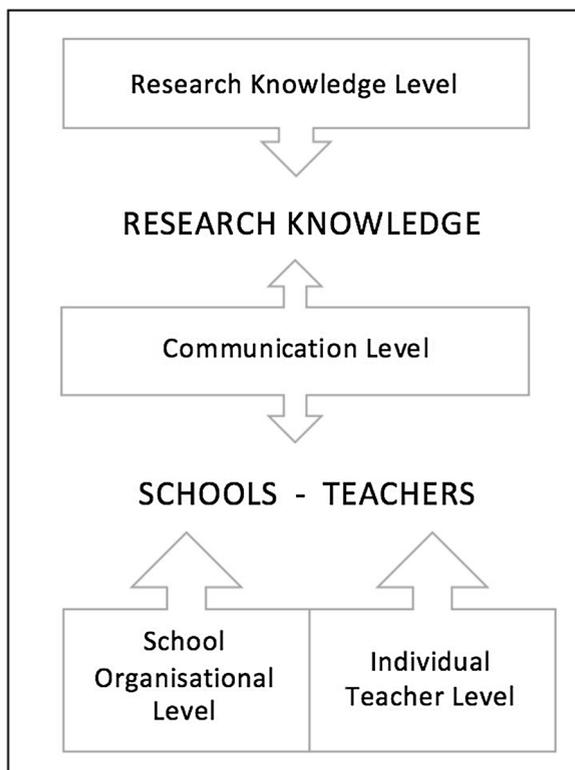
Fig. 1. Four levels for analysing academic knowledge utilisation (Based upon Cooper et al., 2009 and Mitton et al., 2007).

Table 1

Subdivision of levels and categories for teachers' academic knowledge utilisation and examples of information retrieved from the literature, categorised according to our model.

Level	Categories of barriers-conditions	Description of categories	Information retrieved (examples)
Individual Teacher Level	Teachers' skills	Teachers' skills in searching and finding research reports, understanding research jargon and language and applying research findings	"The difficulty of decoding the language of research, particularly for practitioners with little previous experience of research…" (Ion & Iucu, 2014)
	Attitude and perceptions of research knowledge	Teachers' attitudes towards and perceptions of research knowledge and its relevance, practicality, and applicability in their daily practice.	"Predictors of use: 1. teachers' attitude towards research. Opinions are the most frequently referred to and oftentimes constitute the only measure employed to represent research use" (Lysenko et al., 2014)
Research Knowledge Level	Accessibility of research knowledge	Accessibility refers to the ease with which teachers can obtain research-based information	"Other barriers were: having difficulty accessing resources" (Martinovic et al., 2012)
School-Organisational Level	Organisational structure	Formal aspects of the school organisation, including leadership support, time for AKU, and facilitation	"As with research production, there are steps that could be taken to improve the capacity of school systems to benefit from research knowledge. These steps mostly involve a more systematic approach to the work, building it into the way the organisations work so that it becomes a taken for granted feature of school operations" (Levin, 2013)
	Organisational culture	Informal aspects of the school organisation, which together form a climate that is focussed on learning, experimenting and valuing new ideas, supported by teachers' and school leaders' awareness of a broader range of sources, such as research knowledge.	"The lack of the use of knowledge is not at the level of individual resistance, but originated in an institutional culture that doesn't foster learning" (Hemsley-Brown & Sharp, 2003)
Communication Level	Teacher-researcher relationship	A lack of opportunities for teachers and researchers to meet each other and exchange each other's perspectives	"Direct contact between teachers and researchers instead of reading their papers" (Vanderlinde & Van Braak, 2010)
	Teacher-researcher collaboration	Collaboration between teachers and researchers in the research process, in dialogue, with a central importance of a relationship of trust and shared understandings, characterised as a reciprocal collaborative partnership. Mainly referred to as a condition.	"In a collaborative model, researchers and practitioners would work together and recognise each other's expertise and professionalism" (Vanderlinde & Van Braak, 2010)

themselves, such as their skills in translating research knowledge into their teaching practice. Lastly, the communication level includes barriers and conditions related to the communication and collaboration between teachers and researchers or between the organisations they work in.

In the fourth step of the analysis, the retrieved barriers and conditions were assigned to one of the four levels for analysing academic knowledge utilisation. Although it is obvious to which level of information many barriers and conditions belong, there are barriers and conditions that can be attributed to two or more levels. Three questions guided the assignment of barriers and conditions to one of the four levels: 1) Who is the owner of the problem or on what level is the problem situated? 2) Who has the primary responsibility for solving the problem? or 3) Whose action is required in solving this barrier or creating this condition?

The fifth and last step of the analysis was the subdivision of barriers and conditions into categories within each level, resulting in seven categories: teachers' skills in AKU and attitudes towards research knowledge within the individual teacher level, accessibility and applicability of research knowledge within the research knowledge level, organisational structure and culture for the organisational level, and teacher-researcher meeting and teacher-researcher collaboration within the communication level. Within the levels, the level of importance of barriers and conditions is based on a combination of how frequently they appear in the papers and how much emphasis is placed on them, such as the identification of a 'key-condition'. In Table 1, we present examples for each level of our categorisation and the subdivision of the provided four levels and seven categories, with a short description of each category. The four levels and seven categories have been used to structure the findings of this paper; they are not used for decisions to include or exclude information.

3. Barriers and conditions for teachers' academic knowledge utilisation

Our findings are structured into four levels: individual teacher level, research knowledge level, school organisational level, and communication level (see Fig. 1) and seven subcategories (see Table 1). Because factors for teachers' AKU are often presented both as a barrier and a condition for increasing teachers' AKU, we combined the barriers and conditions in the discussion of the four different levels.

3.1. The individual teacher level

The reviewed literature showed that teachers often have difficulties with giving meaning to academic knowledge. In this context,

two categories of barriers and conditions were identified at the teachers' individual level: 1) teachers' skills for AKU, and 2) teachers' attitudes towards and perceptions of research knowledge, including issues concerning applicability of academic knowledge. These results are comparable to the conclusions of Hemsley-Brown and Sharp (2003). Related to the individual teacher level, they conclude that teachers' lack of skills in finding, translating and applying research-based knowledge was a barrier for AKU, and reported teachers' experience in AKU and their perceptions of the value of research-based knowledge as facilitators for AKU.

First, teachers' skills for AKU concern searching and finding research reports, understanding research jargon and language, and applying research findings in practice (Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gushta, 2003; Greenwood & Abbott, 2001; Hemsley-Brown, 2004; Ion & Iucu, 2014; Levin, 2011; Levin, 2013; Lysenko et al., 2014; Walter, Nutley, & Davies, 2003a). The majority of the analysed papers suggest this category is important for utilising knowledge. According to a narrative review study by Cain (2016) on why teachers access research-based information, the provision of research findings alone is insufficient, partly because teachers lack the skills of translating them into their own practical situations, which they see as essentially unique. Based on a questionnaire among teachers (n = 3500) followed by interviews with 25 teachers, Williams and Coles (2007) identify this issue as a lack of information literacy. Information literacy is the capability to locate and critically evaluate information, and to make effective use of information in decision-making, knowledge creation and problem-solving. It encompasses the strategies, skills and knowledge needed to define information needs, and to locate, evaluate, synthesise, organise, present and communicate information as needed.

The second category of barriers and conditions for teachers' AKU at the individual teacher level refers to teachers' attitudes towards and perceptions of research knowledge and its applicability in their daily teaching practice. Throughout literature there has been considerable debate about the applicability, relevance and practicality of research knowledge. Despite the fact that it is plausible to attribute these barriers and conditions to the research knowledge level, we chose to approach them as barriers and conditions at the individual teacher level. The main reason for this is that most studies report these barriers and conditions based on teachers' opinions and their experiences with using research knowledge (e.g. Borg, 2009; Cain, 2016; Landrum, Cook, Tankersley, & Fitzgerald, 2002; Lysenko et al., 2014; Martinovic et al., 2012; Nutley, Jung, & Walter, 2008; Vanderlinde & Van Braak, 2010; Williams & Coles, 2007).

The importance of a positive attitude towards AKU is underlined by several authors (e.g. Judkins, Stacey, McCrone, & Inniss, 2014; Lysenko et al., 2014; Williams & Coles, 2007). Their studies all reveal that a positive opinion about and interest in research knowledge are conditions for teachers' AKU. However, most studies regarding teachers' attitudes and perceptions towards research knowledge (e.g. Martinovic et al., 2012) show that teachers often have limited interest and confidence in using research-based knowledge in their teaching. Martinovic et al.'s study consisted of an online survey (N = 547) followed by 13 focus group interviews with 86 teachers. In line with these results, Lysenko et al. (2014) concluded that teachers perceived their educational problems as extremely complex and unsolvable by research. Similarly, Greenwood and Abbott (2001) find that teachers think that research is too far removed from classrooms.

In many studies, negative attitudes and perceptions seem to be closely related to issues of accessibility and applicability. Teachers criticise research knowledge being unapproachable, inaccessible, difficult and incomprehensible (Broekkamp & Van Hout-Wolters, 2007; Greenwood & Abbott, 2001; Landrum et al., 2002). With regard to the issue of applicability, teachers perceive research knowledge as partial, fragmented, and of little practical use (e.g. Broekkamp & Van Hout-Wolters, 2007; Greenwood & Abbott, 2001; Landrum et al., 2002). Based on a thematic review in combination with focus group interviews with 12 teachers and a questionnaire completed by 68 teachers, Vanderlinde and Van Braak (2010) identify the lack of applicability of research-based information as the most important barrier to teachers using it. Teachers stated that they evaluate research-based information on the basis of whether it can be translated into their teaching practice, and the outcome of this evaluation is mostly negative. Similarly, based on a literature review, Broekkamp and Van Hout-Wolters (2007) identify four interrelated problems that mark the gap between research and practice according to teachers: 1) research does not provide valid and reliable results that are confirmed through unambiguous and powerful evidence, 2) research is limited in practical use, 3) research is not about the daily challenges that teachers have to face, and 4) as a result teachers make little (appropriate) use of educational research. Yashkina and Levin (2008) add to this that according to teachers, researchers often ask the wrong questions, and that there are differences in agendas and expectations between teachers and researchers.

Landrum et al. (2002) examined teachers' assessment of the trustworthiness, usability, and accessibility of information obtained from different sources. The most salient finding of their study is the consistency with which teachers rated research-informed knowledge from academic journals as generally less trustworthy, usable and accessible sources of information than information from their colleagues. In contrast, Williams and Coles (2007) find that only a small proportion of teachers displayed negative attitudes towards research knowledge, researchers and doing research themselves. However, it should be taken into account that the participants in their study were teachers who had some experience in engaging with research.

3.2. The research knowledge level

In the literature since 2001, accessibility of research knowledge by teachers appears to be the main barrier at the research knowledge level. These findings are in line with the conclusions of Hemsley-Brown and Sharp (2003).

Accessibility refers to the ease with which teachers can obtain research-based information, and is one of the most frequently noted features of research knowledge that enhances AKU. Although the situation is changing slowly, much research-based information is still published online behind passwords (e.g. Ion & Iucu, 2014; Levin, 2011; Martinovic et al., 2012; Williams & Coles, 2007). Yet, even if research findings are available, other accessibility issues have to be solved. One challenge is to identify valid, relevant, and reliable information from the masses available (Ion & Iucu, 2014; Levin, 2011). For teachers in particular this can be extremely

difficult, as they are usually interested in knowledge that can be applied immediately. Another challenge is the nature, format, language and presentation of the research knowledge. Based on a study on interventions for enhancing AKU, Levin et al. (2011) suggest that the nature and form in which research reaches teachers affects AKU. Their respondents expressed a strong preference for reports and documents that were readable and practical. Ion and Iucu (2014) and Vanderlinde and Van Braak (2010) report the use of technical and complex language in presenting research-based information as a barrier for AKU. Teachers argued that researchers write in a language that they do not understand.

3.3. The school organisational level

A supportive organisational structure and culture are frequently mentioned as important conditions for teachers' AKU. Structure refers to the formal organisation of a school, and culture refers its more informal aspects.

Hemsley-Brown and Sharp (2003) identify barriers and conditions for teachers' AKU at the organisational level as prominent: "to enhance teachers' AKU, the emphasis should shift from the individual teacher level towards the organisational level". Their conclusions and recommendations are mainly aimed at the organisational level, and refer primarily to the organisational culture, which can be characterised as not fostering learning for teachers. As a consequence, leadership should be viewed as a key facilitator for teachers' AKU.

In line with Hemsley-Brown and Sharp (2003) our study reveals that while individual factors such as teachers' skills are relevant for AKU, organisational factors matter more. To utilise academic knowledge is a very complex process, which goes beyond providing accessible and applicable research-based information in accordance with the previously mentioned individual factors. It can only take place if adequate organisational interventions are in place (Rey & Gaussel, 2016). Levin (2013) claims that there has been too much focus on the characteristics of individual teachers and not enough on AKU as a feature of schools. In line with this claim, many researchers argue that it is unreasonable or even undesirable to make individual teachers responsible for AKU in daily practice. Although there are steps teachers can take themselves to increase their AKU, it is argued that teachers' AKU should be a matter of organisations and systems rather than individuals (e.g. Coburn, 2005; Cordingley, 2008; McIntyre, 2005; Walter, Nutley, & Davies, 2003b). Whether individuals are interested in, pay attention to and make use of research evidence depends much more on the organisational setting of their school and social relations than on their individual backgrounds or dispositions. Knowledge utilisation by teachers is largely shaped by the way the system as a whole is structured, that is the organisation of the school and the daily work as a teacher, and by the social context in which this work takes place (Levin, 2013). Not only do teachers lack skills to find, evaluate, share, and apply research findings, schools are also quite weak in supporting teachers in these areas (Coburn, Honig, & Stein, 2009; Coburn & Talbert, 2006; Cooper et al., 2009; Levin, Cooper, Arjomand, & Thompson, 2011). Levin (2013) characterises this as limited organisational capacity, which includes the structure as well as the culture of an organisation.

Our study revealed barriers and conditions for teachers' AKU that relate to organisational structure and culture. An organisational structure can support AKU; it requires adequate processes in schools to engage with AKU, such as an agenda, or scheduled settings where AKU is discussed by teachers (Coburn et al., 2009; Levin et al., 2011; Rey & Gaussel, 2016). Martinovic et al. (2012) identify leadership support, time for AKU built into school days, and facilitation such as budget for teachers' professional development as conditions for AKU. These authors found that teachers often lack the leadership support in schools to participate in research activities, because school leaders perceive research irrelevant to classroom practice.

However, it cannot be assumed that building the right structures equals successful AKU. Therefore, it is important to not only build structures, but also to foster a culture that supports AKU (Levin et al., 2011). This is underpinned by the results of our study, because one of the most frequently mentioned conditions at the organisational level is a supportive school culture. A research culture and ethos within an organisation is an important condition for teachers' AK Martinovic et al. (2012) call it an inquiry-supportive school culture. Such a culture involves the development of awareness of a broader range of sources than teachers currently use, such as researchers and research reports, an attitude of school leaders that encourages teachers to see information seeking and enquiry as part of professional life, and the development of confidence in seeking and using information (Nutley et al., 2008; Williams & Coles, 2007). Brown, Daly, and Liou (2016) gathered data from 828 teachers in 43 schools and found that teachers are more likely to use research if they perceive the climate of their schools to be focused on learning, experimentation, and valuing new ideas, with frequent and useful interactions around teaching and learning. Levin (2013) argues that besides the structure of their daily work, teachers' AKU is largely shaped by the social context in which this work takes place. However, many studies conclude that there is still no tradition in schools of accessing research results and collaborating with research institutes (Forbes, 2003; Martinovic et al., 2012; Meijer, Oolbekkink, Meirink, & Lockhorst, 2013). As Hiebert et al. (2002) argue, social institutions such as schools are products of cultural contexts and, once established as permanent systems, a source of their own persistence. Therefore, cultures of social institutions are often noted as highly resistant to change. Moreover, Yashkina and Levin (2008) conclude that in schools there is a limited recognition that research is a way to cope with educational problems, and teachers rarely receive extrinsic rewards for participating in collaborative research.

According to many research papers, supportive leadership is an important condition for AKU, mainly because of its relevance for providing structures, but also for creating a culture in which AKU can take place. Ostinelli (2016) argues that the role of leadership is paramount, through actively promoting structural collaboration, creating a positive climate for research use, and providing sufficient support and recourses. However, the vast majority of these papers conclude that teachers perceive a lack of support for AKU from school leaders (e.g. Cornelissen et al., 2015; Martinovic et al., 2012), including insufficient resources in terms of time and funds and a lack of incentives and reinforcements; teachers experience little push to use research, and receive neither recognition nor rewards (e.g. Ion & Iucu, 2014; Levin, 2013).

Many studies mention that one of the most important conditions for teachers' AKU is sufficient time and space to find, read, share and apply research-based knowledge into their daily practice (e.g. Cain, 2016; Dresner & Worley, 2006; Ion & Iucu, 2014; Judkins et al., 2014; Levin, 2013; Little & Houston, 2003; Martinovic et al., 2012; Meline & Paradiso, 2003; Vanderlinde & Van Braak, 2010). However, almost all studies point out that time is insufficiently available. Williams and Coles (2007) conclude that time is vital for AKU; many barriers, such as insufficient accessibility of research knowledge, the lack of skills, and inapplicability of research knowledge were linked to time. If teachers search, find and utilise research-based information it is done on top of their teaching and preparatory tasks (Cooper et al., 2009; Levin, 2011). Similarly, in a literature review on knowledge mobilisation, Levin (2013) argues that it is typical for schools that AKU depends on individual teachers who choose to devote themselves to using research knowledge and to fostering this in the organization. However, relying on volunteers and extra effort is clearly not a sound basis for utilising and applying sustainable knowledge. Based on a questionnaire and interview data of pre-service teachers (N = 85) and in-service teachers (N = 147), Gore and Gitlin (2004) conclude that if the academic–teacher divide is to be challenged, teachers' work should be restructured in such a way that the time teachers spend on AKU is not simply added onto their already busy schedules. Martinovic et al. (2012) find that research time built into the school day was reported by 79.3% of the teachers (N = 547) as a stimulating factor for their AKU.

3.4. The communication level

The main conclusion from the study by Hemsley-Brown and Sharp (2003) concerns the importance of communication between researchers and teachers as a condition for teachers' AKU. Based on this conclusion, they plead for an increased development of communication networks, more links between (individual) researchers and practitioners, and greater involvement of practitioners in the research process. As a barrier at the communication level, Hemsley-Brown and Sharp (2003) identify tensions between teachers and researchers, which is attributed to differences in professional goals. Teachers are characterised as seeking new solutions for operational matters, researchers as seeking new knowledge. In order to reduce this tension, they recommend close collaboration between teachers and researchers, that is teacher involvement in the design, focus and follow-up activities of the research process. They concluded that AKU works best in settings of collaboration.

The least mentioned barriers for teachers' AKU in the literature, however, are barriers at the communication level, which varies between a lack of opportunities to meet researchers, to situations in which teachers and researchers collaborate closely. Only three of the studies included in this literature review mention the communication level as a barrier for teachers' AKU. Moreover, this level mainly concerns the lack of opportunities for teachers and researchers to meet, and the fact that they are generally unknown to each other (e.g. Meline & Paradiso, 2003, Vanderlinde & Van Braak, 2010). A common way to meet are educational conferences and collaborations such as professional learning communities and school-university partnerships. Only the lack of meeting each other at conferences is mentioned in our study as a barrier for teachers' AKU. Based on a survey among attendants of 15 practice-oriented and research-oriented conferences (N = 490), de Vries and Pieters (2007) found that conferences provided formal and informal opportunities for dialogues between teachers and researchers, although contacts between teachers and contacts between researchers at these conferences were prominent. Most conferences were aimed at the classic dissemination of academic knowledge and therefore sustained the traditional role division, where researchers present and teachers consume.

Although not many barriers are mentioned, many articles emphasise communication between teachers and researchers as a condition for teachers' AKU (e.g. Cornelissen et al., 2014; Gore & Gitlin, 2004; Judkins et al., 2014; Levin, 2013; Little & Houston, 2003; Lysenko et al., 2014; Meijer et al., 2013; Ormel, Roblin, McKenney, Voogt, & Pieters, 2012; Rey & Gaussel, 2016; Schenke, van Driel, Geijsel, Sligte, & Volman, 2016; Vanderlinde & Van Braak, 2010). To summarise, they recommend that teachers' AKU can be fostered through collaboration between teachers and researchers in creating knowledge. Vanderlinde and Van Braak (2010) conducted interviews with both teachers and researchers; both groups agreed that collaboration between teachers and researchers would be helpful for closing the gap between educational research and practice, for instance through the creation of communities of inquiry, including both teachers and researchers. Based on three case studies, Christie et al. (2007) conclude that such communities were an appropriate model for collaboration between teachers and researchers in the process of curriculum research, because the different perspectives and traditions of the research and practice communities are equally valued. In the same vein, Cornelissen et al. (2014) stress the importance of equal, reciprocal collaborative partnerships between teachers and researchers.

A consistent finding in the literature is the importance of social settings and interpersonal relationships in shaping professional practice (Levin et al., 2011). Based on literature on social networks, Baumfield and Butterworth (2007) conclude that stronger ties are created between teachers and researchers by becoming partners in the social context of the school. So, with attention to collaboration between teachers and researchers, Baumfield and Butterworth (2007) identify relationships between researchers and teachers as a facilitating condition for teachers' AKU, with an emphasis on trust, shared understanding, a willingness to change one's perspective, and commitment to participate in the dynamics of the group. Their conclusions were based on an analysis of the exchanges between teachers and academics during 12 years of working in school-university collaborative research partnerships, as documented by interviews, case studies and project reports. The importance of relationship between teachers and researchers is also identified by Landrum et al. (2002); teachers were more apt to trust a source of information when they thought that the person providing information understood the challenges they faced, and that they shared professional ground (see also Ainscow, Booth, & Dyson, 2004; Ancess, Barnett, & Allen, 2007; Leat & Lin, 2003; Martinovic et al., 2012; Pareja Roblin, Ormel, McKenney, Voogt, & Pieters, 2014). Mutual trust is also cited by Christie et al. (2007) as being a vital condition in enabling teachers and researchers to have the confidence to share ideas. A strong relationship between teachers and researchers as a facilitating condition for teachers' AKU is empirically supported by Loreman et al. (2015); teachers participating in collaborative research activities reported that these

activities allowed them to see how research was relevant to their practice. Moreover, they helped them to reflect on their teaching practice, and on the fact that research was not something extra, but part of their learning. These results also confirm findings by Lysenko et al. (2014), Walter et al. (2003a) and Williams and Coles (2007) indicating that research collaboration has a positive impact on teachers' attitude towards educational research and their perceived AKU ability, due to the continuous dialogue between teachers and researchers aimed at seeking and crafting solutions for the educational challenges teachers are facing.

4. Discussion and conclusion

We reviewed the literature concerning teachers' academic knowledge utilisation (AKU) since 2001. When referring to academic knowledge utilisation we mean teachers' use of knowledge generated by researchers in the academic community. A model was developed and used in order to analyse barriers and conditions for AKU. In a recent narrative review study, Cain (2016) also identified reasons why teachers do or don't tend to access research. Our study moves forward the debate about teachers' use of academic research, by identifying, as well as categorising barriers and conditions. Although the barriers and conditions might be related to each other, for the purpose of the analysis they were categorised at four levels: the research knowledge level, the individual teacher level, the school organisational level, and the communication level. The model proved to be useful to organise all relevant literature regarding teachers' AKU, and provided a more structured view of why teachers, understood from their perspective, hardly use academic knowledge, and of what conditions foster AKU.

We identified one or two main barriers and conditions at each level. At the individual teacher level, teachers' skills in finding and applying academic knowledge into their own practice, as well as interpreting academic knowledge, and their perceptions of the applicability and relevance of research knowledge are the main barriers. At the research knowledge level, the main barrier found in the literature is the limited accessibility of research knowledge. At the organisational level, a limited supportive structure and culture were identified as the main barriers to teachers' AKU. Structure refers to the formal organisation, and culture to the more informal aspects of a school. However, organisational structure and culture are closely related to each other, and are therefore not always separated in our literature selection. For example, supportive leadership within schools and (a lack of) time are both structural and cultural issues. A limited supportive structure manifests itself in a lack of facilitation and recourses, of which a lack of time for teachers' AKU is most prominent. A limited supportive culture manifests itself in a lack of recognition by teachers and managers that research-based knowledge is a way to improve teaching skills and increase knowledge. Because of the role and responsibility for the development of the structure as well as the culture of schools, a supportive school leadership was identified as a key facilitator for teachers' AKU. Lastly, at the communication level, collaboration between teachers and researchers was identified as strongly facilitating teachers' AKU.

Comparing our results to the study by Hemsley-Brown and Sharp (2003), it appears that barriers are still present at these four levels. However, since 2001, a shift can be observed concerning the communication between teachers and researchers. Based on their results, Hemsley-Brown and Sharp (2003) conclude that more collaboration should be established, with a focus on individual collaboration between teachers and researchers. Many researchers in our study, however, conclude that instead of small-scale collaboration on an individual basis, structural collaboration between schools and research institutes can be a structure or strategy to foster teachers' AKU. In this context, the term 'partnerships' is frequently used (e.g. Baumfield & Butterworth, 2007; Christie et al., 2007; Cornelissen et al., 2014; Lysenko et al., 2014; Martinovic et al., 2012; Meijer et al., 2013; Walter et al., 2003a; van Weert, 2006). According to Martinovic et al. (2012), partnerships can foster research that is collaboratively conducted, relevant, accessible and beneficial to both teachers and researchers. Baumfield and Butterworth (2007) conclude that by becoming partners in the social context of the school, stronger ties arise between teachers and researchers. They identify relationships between researchers and teachers as strongly facilitating for teachers' AKU, with an emphasis on trust, shared understanding, a willingness to change one's perspective, and commitment to participate in the dynamics of the group. These findings are similar to Brown et al. (2016), who found that teachers report an increase in research use due to frequent and useful interactions around teaching and learning, in combination with high levels of perceived trust. Evaluating types of collaboration between teachers and researchers, Edwards, Sebba, and Rickinson (2007) argue that organisational boundaries need to be blurred, not by focussing on knowledge transfer and dissemination of research knowledge, but through working together to produce, use and spread knowledge. Or, as Cornelissen et al. (2015) conclude: the one-way school-university relationship should be changed into a reciprocal partnership.

Structural collaboration or partnerships could be a promising structure to improve conditions on the other three levels as well, although the questions remain concerning how, with whom and on what scale. This idea is in line with findings from the study by Walter et al. (2003a). In their cross-sector review on research use in the field of education, healthcare, social care and criminal justice, they conclude that partnerships could facilitate processes at different levels, through breaking down those barriers that have traditionally inhibited knowledge utilisation.

With regard to the research knowledge level, accessibility could be increased within partnerships, by open access to the research literature for teachers. Furthermore, when teachers and researchers collaborate in the complete research process, from identifying educational needs and new innovations to translating findings into teaching practice, the nature of research could change towards more practice-oriented or design research (e.g. Vanderlinde & Van Braak, 2010; van Weert, 2006). Moreover, structural collaboration could offer a shift from knowledge transfer and dissemination towards collaborative knowledge creation. This way, research knowledge itself would be enriched in relevance and applicability, because it would be integrated with experiences and situational awareness of the complexities and immediateness of the teaching practice and practical know-how (Winch, Oancea, & Orchard, 2015).

At the individual teacher level, partnerships could provide a structure within which teachers can give meaning to academic

knowledge, which in turn can increase their skills in AKU and positive attitudes towards research knowledge. This approach avoids the suggestion that the limited use of academic knowledge in educational practice can be attributed to a lack of skills of individual teachers. Therefore, we think AKU should not only be seen as applying ready-to-use knowledge, but also interpret daily practices and challenges in the light of new insights, and thus give these insights new meaning. The idea of partnerships fits such a cyclical and transformative approach to AKU. This is illustrated by Williams and Coles (2007); the participants in their study displayed positive attitudes towards educational research and their own ability to use knowledge as a result of their experience with research activities. In Meijer et al. (2013), teachers reported increased knowledge and skills in doing research, as well as a more critical attitude, and consciousness of and intentions to change their teaching performance. In partnerships, opportunities for learning from each other and types of professional development can be created through linking research, teaching and professional development practices. Meline and Paradiso (2003) conclude that researchers and teachers possess unique skills and experiences, which are enhanced when they are combined in collaborative efforts. When doing practice-oriented research as equal partners, teachers' attitudes towards AKU could be increased, because of their involvement in research on problems they face in everyday practice.

Lastly, at the school-organisational level, partnerships can stimulate a school culture in which research and using research-based knowledge is acknowledged as a way to improve teaching skills and increase knowledge. Furthermore, partnerships can provide opportunities, facilitation, and support to engage in research activities. This however points out a persistent issue in teaching practice. The most frequently mentioned and most emphasised barrier in the reviewed literature is the lack of time for teachers' AKU (e.g. Cain, 2016; Dresner & Worley, 2006; Ion & Iucu, 2014; Judkins et al., 2014; Levin, 2013; Little & Houston, 2003; Martinovic et al., 2012). Teachers' weekly schedule is generally packed with lessons and little or no time is left for AKU. Although partnerships in themselves cannot solve this issue, the acknowledgement from school leaders in particular that AKU is a way to cope with educational challenges in teaching practice could contribute to them providing more time for AKU. However, time restraints continue to be a challenge. Consequently, the role of leadership appears paramount; school leaders have the responsibility to create an organisational culture and structure in which research knowledge could connect to teacher knowledge (e.g. Brown & Zhang, 2016), to work actively for the establishment of a positive ethos in collaboration, and to provide the necessary resources and support. In addition, they should be aware of not losing lose their enthusiasm, nor limit themselves to requests for quick solutions (Ostinelli, 2016).

5. Limitations and further research

First, as our selection criteria originated in the interest in teachers' perspective and role in the process of knowledge utilisation, the researchers' perspective was outside the scope of this study. For this reason, barriers and conditions related to researcher knowledge in the context of organisations of researchers, such as universities, were not taken into account.

Second, the results of our study are a representation of the literature on knowledge utilisation based on the search terms we used. Thus, this study did not include all literature on AKU. This is because our search was aimed at barriers and conditions for AKU. Therefore, literature on forms of collaboration such as professional learning communities or school-university partnerships *per se* is not included.

Our study revealed that more structural collaboration, bringing two communities physically or virtually together, could foster teachers' AKU through collaboratively discovering and interpreting new knowledge and developing research-based practices. However, establishing such partnerships entails several challenges and questions as regards whom to involve and on what scale. The number of universities and research institutes is too limited to build communities with all schools and teachers. And although local initiatives seem to be successful, the scale problem remains. Therefore, creating physical partnerships is just one part of the solution. Another way to connect the two communities is through communication networks. Hemsley-Brown and Sharp (2003) already concluded that the development of communication networks could foster AKU. However, the reviewed literature largely focused on more physical collaboration. In this regard, the development of digital communication means since 2003 offers a wealth of opportunities for virtual communication and collaboration. Since 2003 digital platforms for communication and collaboration have become part of everyday work. Future research could offer insight into how communication networks could foster teachers' AKU.

That said, many questions remain open for further research, such as how such partnerships could be composed, and which types of collaboration could increase teachers' AKU. Further research should connect the literature about teachers' AKU and about partnerships between schools and universities. In the selected literature, we found barriers and conditions for teachers' AKU that are worth considering in the creation of partnerships. Another interesting question that remains concerns supportive leadership as a prominent condition for teachers' AKU; what type of leadership is needed, and what does leadership support look like in a school-university context? Furthermore, within current partnerships, teachers' AKU should be subject to further research: what are the effects of such partnerships on teachers' AKU, and what do teachers actually do when utilising academic knowledge?

6. Implications for policy and practice

Implications on three levels will be discussed here. Concerning school leadership, two implications follow from our study. First, school leaders have the responsibility to create an organisational culture and structure within their schools in which research knowledge can connect to teacher knowledge, because AKU is largely a matter of how organisations operate, which deeply affects the way how individual teachers work (e.g. Brown & Zhang, 2016; Levin, 2011, 2013). This includes providing time, opportunities and support for teachers' AKU, and acknowledging and rewarding these efforts as part of their professional development (e.g. Pareja Roblin et al., 2014).

Second, one way of promoting AKU is for school leaders to search for opportunities for structural collaboration with research

institutes in ways that fits the specific situation of their schools. A study by Schenke et al. (2016) identifies four types of cross-professional collaboration between teachers, school leaders and researchers: (a) school-directed collaboration; (b) school- and researcher-directed collaboration; (c) school- and adviser-directed collaboration; and (d) researcher-directed collaboration. The identification of these four different types of cross-professional collaboration can support schools in choosing a type of collaboration that fits their specific situation.

As concerns teacher education, an implication of our study is the need for more engagement with research activities and the further introduction of research skill training in pre-service teacher education. New teachers should become familiar with systematically researching and evaluating their own teaching practice and linking this to what they learn about (pedagogical) content knowledge. In this context, Winch et al. (2015), conclude that partnerships could provide opportunities for increasing teachers' AKU, both in initial and continuing teacher education. Therefore, initial teacher education should aim for models that develop professional teachers who are scholars of educational research. Furthermore, continuing education for teachers may include masters' level programmes that endow teachers with the capacity to carry out practice-based research in partnerships (Winch et al., 2015).

Lastly, concerning government policy, our study calls for more research funds and support for the further establishment of research partnerships between schools and universities, innovative communication networks, and more time for teachers to engage with research activities in addition to their daily work. Although this could be viewed as an implication at a school-organisational level, government policymakers could be of major importance through assigning more of teachers' time to searching, finding, translating and discussing research findings.

7. Concluding remarks

In conclusion, teachers' utilisation of academic knowledge has been subject of research since 2001. Reviewing this research, we conclude that partnerships or structural collaborations between schools and research institutes could be a way to counter barriers and create favourable conditions for teachers' AKU. Partnerships could provide a context in which academic knowledge will become accessible, relevant, and applicable, and the improvement of AKU will be possible. Moreover, when working as equal partners, teachers and researchers could connect their specific types of knowledge and experience, not only in the utilisation of knowledge, but also in the creation of new knowledge. If this step could be made, AKU could shift from a one-way school-university relationship (the knowledge will be created by researchers, and utilised by teachers), towards a reciprocal relationship, where the co-creation of knowledge could foster the utilisation of this knowledge by teachers, because of its accessibility, practicality, and close connection to their everyday practice. Besides school-university partnerships, new innovative communication networks between teachers and researchers could be another way to foster teachers' academic knowledge utilisation.

Conflicts of interest

None.

Appendix A. Reviewed literature

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