Interaction between educational research and practice: Collaboration, strategies and conditions

Katrijn Opstoel [a],[*], Edwin Buijs [a], Janneke van der Steen [a], Wouter Schenke [b], Wilfried Admiraal [c], Helma Oolbekkink-Marchand [a]

[a] *HAN University of Applied Sciences, Nijmegen, the Netherlands*
[b] *Penta Nova, Utrecht, the Netherlands*
[c] *Oslo Metropolitan University, Oslo, Norway*

ARTICLE INFO

ABSTRACT

The aim of this study was to gain insight in knowledge mobilization (KM) in educational research, focusing on the type of collaboration, the strategies and the conditions. KM reflects the interaction and relationship between educational research and practice and requires specific effort over time. We studied 69 research reports and held 12 group interviews with consortia of researchers and teachers. Results show that the research projects could be characterized as researcher-directed or school-and- researcher directed collaboration. Strategies for KM found in these collaborations were mainly 'transferring' and 'implementing'. 'Co-creation' as a strategy was found more often in school- and researcher collaboration projects. Finally, the conditions enabling or constraining KM were found at the level of research knowledge, the individual teacher and researcher, school organization, research organization, consortium, and communication. Implications for future research are discussed.

1. Introduction

Educational research can be understood as an applied discipline with a dual purpose of advancing both theory and practice. Yet, scholarly research about education has little impact on educational practice in primary and secondary schools. Concerns about the use of scientific knowledge for educational practice have been the subject of discussion for years, referring to the gap between theory and practice (Broekkamp et al., 2009; Ion et al., 2019; Sjölund et al., 2022). Teachers tend to resent researchers for examining questions that are not their concerns, for publishing in peer-reviewed journals instead of disseminating their work in practice, and for aiming at the generalization of insights rather than improving school practice (Vanderlinde & van Braak, 2010). Solutions are often sought by making research more accessible for educational practice or groups in which teachers and educational researchers work together (e.g. Coburn & Penuel, 2016; Sjölund et al., 2022). A collaborative approach is becoming more and more common as it is suggested to ensure the educational relevance and meaningfulness of the research (McGeown et al., 2023).

In this paper, we use the term knowledge mobilization (Levin, 2013) to refer to efforts to understand and strengthen the interaction and relationship between educational research and practice. Knowledge mobilization "requires specific effort, over time, working with others, and involves much more than telling people about research findings" (Levin, 2013, p. 2). Along similar lines, research-practice partnerships, aimed at bringing research and practice closer together, are mutualistic and long-term, and have intentional strategies to foster partnership relations (Sjölund et al., 2022). However, it is yet to be determined what these specific efforts consist of and how they can affect educational practice and provide opportunities to formulate educational policies. In this paper, we report on our analyses of educational research projects funded by the Dutch Research Council.

1.1. Knowledge mobilization in educational research

In this paper, knowledge mobilization is understood as an interaction between research and practice over time, implying multiple efforts. Ion and Iucu (2014) distinguish between several ways of using research knowledge (e.g., instrumental, conceptual and strategic research use). This distinction is similar to that of Weiss (1979), who labeled the last term "symbolic research use". Instrumental research use implies a concrete application of research, often translated into materials that can be

used to direct specific interventions. Cooke et al. (2017) stress the importance of 'actionable outputs' that are coproduced by researchers and practitioners and thus have the potential to blur the boundaries between knowledge users and knowledge producers. Conceptual research use is based on research that may change thinking but not necessarily specific practices. Strategic research use involves the use of research as a persuasive or political tool to legitimize a particular position or practice. Mobilizing knowledge can be focused on any of these ways of using knowledge.

Other terms have been used to refer to the same process – e.g., 'dissemination,' 'knowledge utilization,' 'knowledge transfer,' 'knowledge exchange,' and 'knowledge translation' – all with their own connotations (Graham et al., 2006; Levin, 2013; Van Schaik et al., 2018). Teachers also have a professional knowledge base that results from continuous reflection on experience (in different educational contexts) and theoretical insights (Levin, 2013); closely related to the term phronesis used by Aristotle (see Ellett, 2012). This professional knowledge base is important to the process of knowledge mobilization. By using the term knowledge mobilization, we would like to emphasize that knowledge is mobilized instead of transferred unchanged and that efforts *aim* at using knowledge in educational practice, not having an impact per se; realization of the actual impact is still a responsibility of teachers and policy makers.

Knowledge can be mobilized and studied in different ways. As indicated by Nilsen (2015) in the implementation of science different theories, frameworks, and models are used. Nilsen makes a distinction between models and frameworks to describe and/or guide the process of translating knowledge into practice (process models), to understand or explain what influences the implementation of outcomes (determinant frameworks), and to evaluate implementation (evaluation frameworks). In this study, we refer to the first two kinds of frameworks that are related to the aims of our study: the process model by Landry et al. (2001) and insights from Castelijns and Vermeulen (2017), and a so-called 'determinant framework' from the study of Schenke et al. (2016). The framework of Landry et al. (2001) describes knowledge mobilization at various stages, from its initial origination to its use in practice or research. Landry et al. (2001) adapted the original framework of Knott and Wildavsky (1980) and applied six stages of knowledge mobilization in their survey study among Canadian social science scholars: 1) Transmission: researcher actions to transfer knowledge to teachers and other professionals, 2) Cognition: teachers' comprehension of research findings, 3) Reference: teachers refer to research findings, 4) Effort: teachers make some efforts to adopt the research findings, 5) Influence: teachers' decisions are influenced by research findings, and 6) Application: teachers apply research practice. Knott and Wildavsky (1980) also included a seventh stage in their original framework: impact. It refers to whether implemented policies based on the research findings have the desired effects in practice.

Davidson and Nowicki (2012) applied the original seven-stage framework to study the possible gap between reading disabilities research and teachers' self-reported use of that knowledge base. Qualitative analysis of interview data indicated that teachers did not receive research information nor look for it themselves, although they needed to know more about identifying and instructing students who are at risk of reading disabilities. This limited receipt meant limited application of the other stages, leading to limited teacher effort to implement research knowledge.

Teachers, in the aforementioned study, appointed obstacles related to the supply side, the demand side and the context (Davidson & Nowicki, 2012). Supply-side obstacles included poor access to research knowledge, inadequate dissemination of research, and research not meeting teachers' needs. Demand-side obstacles included users' lack of knowledge about research, limited time to access, read, and digest research, resistance to new ideas, and misuse of research in previous innovations, reforms, or organizational changes. The third group of obstacles teachers mentioned relates to context: researchers and

teachers live in two different worlds, teachers perceive that research lacks relevance to their particular context, and teachers may work in a discouraging school environment (no resources and no support from colleagues and leaders).

These obstacles are similar to those found in other studies on the gap between theory and practice in educational research (e.g., Lysenko et al., 2014; Van Schaik et al., 2018). Van Schaik et al. (2018) reviewed the literature on teachers' mobilization of academic knowledge and identified barriers and conditions at four levels: individual teacher, research knowledge, school-organizational, and communication. Barriers or negative conditions at the teacher level relate to, for example, teachers' skills in searching, finding, and interpreting research and attitudes toward educational research. Those are similar to the demand-side obstacles found in Davidson and Nowicki's (2012) study. Barriers at the research knowledge level include the accessibility and comprehensibility of research knowledge; these are similar to the supply-side obstacles Davidson and Nowicki (2012) mentioned. Barriers at the school-organizational level and communication level are similar to Davidson and Nowicki's context-related obstacles. These include knowledge mobilization that is supported and facilitated, both formally in school and informally as part of the school culture (school-organizational level), and teacher-researcher interaction and collaboration (communication level). In line with Levin ((2013)), we take the findings of Van Schaik et al. (2018) about barriers at the communication level a bit further and argue that knowledge mobilization is also a social practice.

The seven-stage framework of knowledge mobilization described above is mostly about the *outcomes* of knowledge mobilization, mobilization activities or strategies. Castelijns and Vermeulen (2017) identified four *types of strategies* to mobilize research knowledge from the perspective of researchers: 1) transferring: producing materials or publications that teachers can use, 2) influencing: presenting research findings and the way these can be used in practice, 3) implementing: producing materials and procedures on how to implement research findings in practice, and 4) co-creating: collaborating with teachers in research to further develop both theory and practice.

Co-creating is a valuable strategy in response to the critique that academic propositional knowledge is privileged over professional knowledge which can be equally valid even if tacit (Miller & Pasley, 2012). Collaboration between teachers and researchers is a way to make research knowledge part of stakeholders' practices and experiences, as well as use valuable professionals' knowledge based on their experiences (Jones et al., 2022). Schenke et al. (2016) studied the characteristics of cross-professional collaboration in research and development projects in education and identified four types of cross-professional collaboration: 1) school-directed collaboration: teachers and school leaders collaborate in educational research, 2) school- and researcher-directed collaboration: teachers and researchers collaborate in educational research, 3) school- and adviser-directed collaboration: advisers from outside school lead educational research, and 4) researcher-directed collaboration: researchers from outside the school carry out educational research. These types of cross-professional collaboration differ in who is directing and carrying out educational research, which may have consequences for the extent and the way research knowledge is mobilized and used.

1.2. This study

Previous work on knowledge mobilization or similar terms showed limited uptake of research knowledge in educational practice and obstacles that are responsible for this gap between educational research and practice. That gap was one of the main reasons the Dutch Research Council started the Education Research Initiative to finance research projects with a dual focus on advancing theory and practice, carried out in educational practice and in collaboration with teachers. This specific context in which collaboration between researchers and teachers is

given could provide additional insights into knowledge mobilization. Therefore, this study analyzes practice-based research projects funded by the Education Research Initiative in the last five years to answer the following research questions:

1. What types of research collaboration can be identified in research projects?
2. How do types of research collaboration differ in terms of strategies for and outcomes of knowledge mobilization?
3. What enablers and constraints are reported with respect to knowledge mobilization?

2. Methods

2.1. Document analysis

A document analysis was performed to provide insight into the types of research collaboration and the strategies for and outcomes of knowledge mobilization **(RQ1, RQ2)**. The Dutch Research Council required all consortia whose projects were funded by the Education Research Initiative to write a research report with the following information: the project goals and research questions, the consortium formed to carry out the research, the context, and the method, findings, and conclusions. We searched the Dutch Research Council's online database for research reports about short-term (12–18 months) and long-term (max. 36 months) practitioner research completed between 2014 and 2020. In total, we reviewed 69 research reports about 57 short-term projects and 12 long-term projects. An overview of research topics per year and the number of short- and long-term research projects is presented in Table 1.

2.2. Interviews

2.2.1. Project selection

We interviewed project staff to gain a deeper understanding of the strategies for and outcomes of knowledge mobilization **(RQ2)** and the enablers and constraints of knowledge mobilization **(RQ3)**. Based on the document analysis, we selected research projects representing a variety of calls, types of researcher-teacher collaboration, and educational contexts (primary education, secondary education, or secondary vocational education and training; see Table 1). For each research project, we contacted the project leader and asked to approach researchers and teachers (teachers, school leaders) from the project for an online group interview.

Of the 17 consortia that we approached, 12 were willing to participate (see Table 2). For two consortia, only the researcher was able to attend the interview (because of time constraints or the fact that the research project ended some time ago). Although this influenced the data collection, we took these single-person interviews into account because they gave us an indication of knowledge mobilization in the consortium.

2.2.2. Group interviews

The group interviews took place online via Microsoft Teams and were audio-taped. The average duration was 75 min, and all participants provided active consent. During the interviews, the participants jointly drew a digital timeline in which they showed the moments when knowledge mobilization activities began and moments when they noticed that teachers experienced benefits. The timeline was presented in Microsoft PowerPoint and was intended to illustrate knowledge mobilization activities and outcomes during the research project. Participants were also asked which factors enabled or constrained knowledge mobilization. The interview summaries were sent to the interviewees for approval.

2.3. Data analysis

2.3.1. Documents

The 69 research reports were categorized using the four types of collaboration (Schenke et al., 2016): school-directed collaboration, school- and researcher-directed collaboration, school- and adviser-directed collaboration, and researcher-directed collaboration **(RQ1)**. Therefore, we focused on indications in the research reports concerning the reasons for cross-professional collaboration (e.g., to provide insights into a practical school issue or achieve a researcher's goals), the division of roles and tasks between teachers and researchers (e.g., who is in the lead), and the communication between parties (e.g., how often do they meet) (see Schenke et al., 2016). We identified one type of collaboration in each project report.

Second, we used Castelijns and Vermeulen's (2017) strategies (see Appendix A) to describe the knowledge mobilization **(RQ2)**. We referred

Table 1

Research topics per year and the number of short- and long-term projects (*n* = 69).

Starting Year	Call	N
2014	Short-term practitioner research Differentiation in the classroom Benefits of learning with ICT Didactics of language and mathematics	16
2015	Short-term practitioner research Learning and instruction Formative evaluation Differentiation in the classroom Benefits of learning with ICT	15
	Long-term practitioner research *Free choice of theme or topic*	12
2016	Short-term practitioner research *Free choice of theme or topic*	14
2017	Short-term practitioner research Pedagogy of subjects other than language and mathematics (e. g., cultural education, philosophy, physical education) The socializing function of education Conditions for educational innovation, with a focus on the role of school management and boards	12

Table 2

Overview of the 12 projects selected for group interviews.

	Short-/long-term	Context	Type of collaboration	Interviewees
1	Short-term	2	School- and researcher-directed collaboration	2
2	Short-term	1	Researcher-directed collaboration	1
3	Short-term	2	Researcher-directed collaboration	1
4	Short-term	2	School- and researcher-directed collaboration	4
5	Short-term	1	School- and researcher-directed collaboration	2
6	Short-term	1	Researcher-directed collaboration	2
7	Short-term	3	School- and researcher-directed collaboration	5
8	Short-term	1	School- and researcher-directed collaboration	5
9	Short-term	2	Researcher-directed collaboration	5
10	Long-term	1	School- and researcher-directed collaboration	3
11	Long-term	1	School- and researcher-directed collaboration	3
12	Long-term	2	Researcher-directed collaboration	5

Note: Context: 1 = primary education, 2 = secondary education, 3 = secondary vocational education and training.

to descriptions of the four types of strategies to screen the method, results, and discussion sections of each report, resulting in at least one type of strategy per report.

Third, we analyzed the outcomes of knowledge mobilization **(RQ2)** using the third to sixth steps of the Linkage and Exchange Framework (Landry et al., 2001) and the seventh step from Davidson and Nowicki (2012) (see Appendix B). The first two steps were not used because they are difficult to identify in written reports. We took an approach similar to that described above for answering research question 2.

2.3.2. Interviews

We also analyzed the interview data using Castelijns and Vermeulen's (2017) knowledge mobilization strategies **(RQ2)** with two additions. First, applications in the context of teacher training courses were coded as level 3, 'implementing.' Second, a category (level 4a) was added for teachers' active participation in research that was in itself not aimed at knowledge mobilization but increased the chance to do so.

We then used the Linkage and Exchange Framework (Landry et al., 2001) to categorize the outcomes of knowledge mobilization activities **(RQ2)**, and we added the seventh process step from Davidson and Nowicki (2012) (see Appendix B). Given that it was difficult to distinguish 'teachers took action to put results of research into practice' (level 2: effort) from 'the results of research influence: the choices and decisions of teachers and whether they decide to take action' (level 3: influence), we narrowed the definition of 'effort' to situations in which teachers encouraged colleagues within their own organization to use the research results.

We used this modified framework to analyze the described knowledge mobilization activities and outcomes. Each description of an activity or outcome was coded. For example, when interviewees mentioned that a practitioner article was written and published based on the research results, we coded this as a knowledge mobilization activity at level 1 (Transferring) and subcoded it as a 'Practitioner article.' Subcodes that appear in two or more projects were included in the description of the results (see also Appendices A and B). The differences between types of collaboration with respect to strategies and outcomes **(RQ1)** were examined with cross tables.

Seven categories (see Appendix C) were used to map enablers and constraints **(RQ3)**. The categories of research knowledge, individual participating teacher, school organization, and communication were based on Van Schaik et al. (2018). The categories of individual participating researcher, research organization, and organization/consortium were added based on preliminary analyses of the interview data.

Two researchers who divided the work analyzed both the documents and group interviews. Types of collaborations were coded based on the documents, enablers and constraints were coded based on the interview data, and mobilization strategies and outcomes were coded based on both data sources. The coding instruments and adaptations were discussed in project meetings with all six researchers. If a coder was in doubt about coding, two other researchers checked the coding and discussed it in project meetings until consensus was reached.

3. Results

3.1. Types of research collaboration

Two types of collaboration were identified by analyzing the research reports: researcher-directed collaborations and school- and researcher-directed collaborations. The other two forms of collaboration identified by Schenke et al. (2016) (i.e., school-directed and school- and adviser-directed collaboration) did not appear in the research reports. Of the 69 research reports, 28 (41 %) were classified as researcher-directed collaboration and 41 (59 %) were classified as school- and researcher-directed collaboration.

3.2. Knowledge mobilization strategies

Transferring was identified as a strategy for knowledge mobilization in 56 research reports (81 %) and in all 12 interviews. This includes written (e.g., professional and academic publications and contributions to books) and digital publications (e.g., knowledge clips and instruction videos). Knowledge mobilization materials were distributed via platforms including a project website, a national platform, blogs, newsletters, news on the school website, and annual school reports.

The 'Influencing' category was found in 21 research reports (30 %) and in all 12 interviews. This included activities in which (future) knowledge users were influenced based on direct interaction. The interviews show that presentations or workshops at national or international conferences were the most common way of connecting to future users. For a few projects, the project's leaders organized their own conference to share research findings. Other activities include a final project meeting or a stakeholders' day held for the consortium, presentations at school, and presentations or workshops on occasions other than a conference.

Implementing (by developing procedures or applications for implementation) as a knowledge mobilization strategy was found in 56 research reports (81 %) and 9 of the 12 interviews. Interview participants mentioned the application of knowledge in teacher education most often, and this can be seen as both a knowledge mobilization strategy and an outcome (see below). Other knowledge mobilization methods include developing tools that can be used in practice, such as a practice book or a training manual. Other applications include lesson series, course modules, a model with design principles, and manuals for research instruments and data analysis.

Co-creating or transformation of knowledge was found in 37 research reports (54 %) and 5 out of 12 interviews. The interviewees mentioned that teachers were involved in designing and developing materials such as teaching materials, manuals, or prototypes for teacher professionalization materials.

In addition to co-creating, 11 of the 12 interviews discussed teachers' active participation in research that was not directly aimed at knowledge mobilization but increased the chance that it would lead to it. For example, in some projects, teachers carried out an intervention, were involved in the data collection and/or data analysis, visited and observed classes led by their colleagues, or took part in a training program, instruction session, or coaching trajectory. The latter were meant to prepare teachers to implement an intervention, to actually do so, or to guide them in conducting research.

3.3. Outcomes of knowledge mobilization

We analyzed the outcomes of knowledge mobilization found in the research reports and interview data. The document analysis showed that 'Reference' was not mentioned as an outcome of knowledge mobilization in any of the research reports. However, it was mentioned six times in the interviews. In all those cases, 'Reference' involved end users who, according to the interviewees, came to new insights or ideas. In two projects, research was referenced in the curriculum of a teacher education institute or referred to by Dutch or international researchers. Four projects referred to outcomes of knowledge mobilization in researched practice through active participation in the research.

In three of the 69 research reports (4.3 %) and two of the 12 interviews, effort was mentioned as an outcome of knowledge mobilization. Examples from the interviews include a school leader encouraging colleagues to participate in conferences and a teacher sharing project findings with other practitioners.

In nine research reports (13 %) and two interviews, influence was mentioned as an outcome of knowledge mobilization. For example, in one project, participants adopted a practice from the project and continued to work in research groups.

In two research reports (5 %) and eight interviews, application was

mentioned as an outcome of knowledge mobilization. The interviewees also mentioned that research knowledge was applied in teacher education. For example, students from a teacher training college used insights from the research project for their thesis or teaching portfolio. Another example involved using the research project in modules on teacher research in teacher education by, for example, presenting the project as an example of design research.

In ten interviews, participants mentioned outcomes at level 4 (application) through active participation in a research project. In six of these projects, teachers could gain (some) research experience and skills through active participation in research practices such as data collection and analysis. In addition, participants in six interviews mentioned that teachers who had participated in the study still used results, insights or materials from the research in their teaching practice.

None of the research reports mentioned impact as an outcome of knowledge mobilization, but it was mentioned in two interviews. In one project, teachers' participation in training had led to the desired effects on teacher behavior and student performance. In another project, a teacher who participated in the study had applied knowledge from the study at another school (not included in the project) and noticed positive effects on his students.

3.4. Differences between types of research collaboration and strategies and outcomes of knowledge mobilization

Table 3 presents the strategies for and outcomes of knowledge mobilization separately for researcher-directed and school- and researcher-directed collaboration, based on the document analysis. Concerning the strategies used, a remarkable difference between both types of collaboration occurred for co-creation, which is relatively more common in school- and researcher-directed collaboration.

Outcomes of knowledge mobilization were only mentioned in a few project documents. When the types of collaboration are compared, a difference in outcomes can be seen. Knowledge was mentioned as an outcome of only one researcher-directed project (categorized as Effort), while Influence and Application were mentioned in school- and researcher-directed projects (in nine and two projects, respectively).

3.5. Enablers and constraints of knowledge mobilization inside and outside the project

Below, we discuss the enabling and constraining factors that emerged from the group interviews and cluster them in the level of research knowledge, individual participating teacher/researcher, school/research organization, or communication (Van Schaik et al., 2018).

Table 3
Strategies for and outcomes of knowledge mobilization for researcher-directed and school- and researcher-directed collaboration.

	Researcher-directed	School- and researcher-directed
	28 (100 %)	41 (100 %)
Strategies for knowledge mobilization		
Transferring	23 (82 %)	33 (81 %)
Influencing	7 (25 %)	14 (34 %)
Implementing	22 (79 %)	34 (83 %)
Co-creating/transformation	7 (25 %)	30 (73 %)
Outcomes of knowledge mobilization		
Reference	0	0
Effort	1 (4 %)	2 (5 %)
Adoption/influence	0	9 (22 %)
Application	0	2 (5 %)
Impact	0	0

3.5.1. Level of research knowledge
Connecting to (existing) needs was mentioned as an enabling factor (eight projects). Examples are videos in which interventions were explained and illustrated, and a researcher who gave workshops about the research results with concrete examples from practice. In contrast, limited transfer to other target groups/ educational contexts was an impeding factor (four projects).

3.5.2. Level of the individual participating teacher
Active involvement of teachers in the research project as teacher-researchers or in design and development (e.g., of teaching materials) was an enabling factor (seven projects). It is also helpful when teachers have a strong drive or willingness to acquire knowledge and share the knowledge gained (five projects).

An impeding factor was a lack of knowledge, skills, and attitudes among teachers (five projects). This includes specific skills that demand a lot from novice teachers (in particular, a lack of research expertise that hindered more active participation of teachers in the research) and teachers' negative beliefs about using research knowledge.

3.5.3. Level of the individual participating researcher
The researchers' enthusiasm for the topic of the research project and a strong motivation to disseminate the knowledge were mentioned as enabling factors in two projects.

3.5.4. School organization level
Time and space provided by the school were beneficial, as were the facilitation available from the project budget (four projects). Another beneficial factor was the involvement of a school leader or supervisor (four projects). One impeding factor was a lack of prioritization and commitment (five projects). For example, there may be too little ownership by teachers, a certain theme may 'not be alive' in a school, or teachers may be led by the issues of the day. Another impeding factor refers to insufficient facilitation by the school organization (three projects). If teachers cannot be facilitated by project resources, they are dependent on facilitation by their own educational institution, which is not always possible.

3.5.5. Research organization level
At this level, the facilitation of researchers was mentioned as an enabler (three projects). Two professors and a PhD student indicated that they have time for knowledge mobilization activities due to their position, regardless of the budget available for the research project. In contrast, insufficient facilitation from the research organization was mentioned as an impeding factor (two projects). In those projects, researchers stated that they also have a lot of time to spend on other tasks in their organization.

3.5.6. Level of the organization/consortium
First, facilitation from the research budget was mentioned as an enabler: time and space created to make knowledge mobilization possible (four projects). A second enabler involved building on existing collaboration (three projects). This helps to build on previous knowledge and insights.

The first impeding factor relates to insufficient facilitation from the research budget (five projects). If the time and resources of a project are 'exhausted,' the knowledge mobilization also (partly) stops and there is less chance of building a sustainable collaborative relationship.

Second, interviewees referred to problems with subsidy requirements and research funding (four projects). According to some, the requirement for a large consortium can be detrimental to collaboration and, if the resources have to be distributed among several organizations, relatively few resources remain for each organization. According to the interviewees, the competitive element of subsidy applications in which researchers promise a lot for a low budget in the hope of receiving the subsidy creates a risk that the ambitions may turn out to be too great for

the available budget. Third, interviewees mentioned that project continuity sometimes depends on the involvement of specific people (three projects). If, for example, a lecturer or researcher retires or moves to another organization, some or all of the knowledge mobilization often stops.

3.5.7. Level of communication

The first enabling factor mentioned was the broader dissemination of knowledge with the aid of partners who have a broader reach (eight projects), including the aid of teacher training programs (three projects). Examples are teacher training institutes that include research outcomes in their curriculum and a project in which a training course was developed and then taken over by the university's Educational Advice and Training Department after the project was completed. Other examples of broader dissemination are disseminating knowledge via a publisher's website instead of via one's own website, entering into discussions with bodies such as the Education Inspectorate, SLO (the Netherlands Institute for Curriculum Development) and publishers instead of with individual teachers, and involving the 'right people' (such as language coordinators in a project on language).

Second, this level includes the timing and setting of knowledge mobilization/communication (six projects). Involving practitioners at an early stage increases the chance that materials will be used. It is also valuable to already perform knowledge mobilization activities during the project. Furthermore, knowledge mobilization can be promoted by using each other's expertise (e.g., researchers who focus on literature and teachers who bring concrete examples from practice).

Third, it involves interaction with colleagues or other teachers (five projects), by interviewing each other, conducting class visits together, doing research together, exchanging experiences and making recommendations.

At this level, one impeding factor is limitations in communication (three projects). Some participants felt their communication had a limited reach within their own network ('You cannot just write to schools or send out an advertising email'). Speaking another language (e.g., using different terminology and different perspectives) can also be a barrier. Miscommunication sometimes occurs (e.g., teachers were unaware that they would be compensated for participating in a survey).

4. Conclusion and discussion

Cross-professional collaboration between educational researchers and school practitioners has the potential to affect educational practice in primary and secondary schools, but earlier studies show that it requires significant effort from both researchers and teachers (e.g., Meijer et al., 2013). This study confirms that knowledge mobilization can be seen as a relational process, a social practice that involves *collaboration* between researchers and schoolteachers. A research project's goals, the division of roles and tasks among project participants, and the enablers and constraints all influence how these collaborations are shaped.

This study suggests that the type of research collaboration (researcher-directed versus school- and researcher-directed) can be related to strategies and outcomes of knowledge mobilization. Concerning knowledge mobilization strategies, we found that both transferring (e.g., in professional and academic publications) and implementing (e.g., developing tools that can be used in practice) were used in both types of collaboration.

Co-creation, which Castelijns and Vermeulen (2017) cited as a strong strategy to mobilize knowledge, was not often witnessed in the research projects in our study. Yet, co-creation was found more often in school- and researcher-directed collaboration than in researcher-directed collaboration. These teachers were more equally involved, which encouraged their professional knowledge to be more equally validated by researchers as compared to academic knowledge (Miller & Pasley, 2012; Meijer et al., 2013). The finding that co-creation leads to better engagement is supported by Greenhalgh et al. (2016) who studied the

research impact of co-creation in community-based health services. An additional opportunity for co-creation arises when teachers actively participate in research. Although this kind of co-creation often was not directly aimed at knowledge mobilization, it increased the chance that it would lead to it.

Regardless of the type of collaboration, researchers, teachers, and school leaders are interacting in ways that affect knowledge mobilization, as the study by Schenke et al. (2016) already showed. Yet, the current study suggests that the type of collaboration influences the role of teachers in these projects. In the case of school- and researcher-directed collaboration, teachers were more involved as co-creators. Furthermore, we found that teachers participated more often in the collection and analysis of data when they were part of school- and researcher-directed collaboration rather than researcher-directed collaboration.

Although we found these differences in strategies, it was more difficult to gain an understanding of the outcomes of knowledge mobilization. These were either not explicitly reported and/or the researchers and teachers did not know the results of knowledge mobilization. However, the interviews provided several insights into the outcomes of knowledge mobilization. In particular, the interviews showed that research results were often implemented in teacher education programs. The work relationships between project participants and stakeholders in teacher education programs contributed to the broader dissemination of research results. Our study also shows that participation in research projects can lead teachers to relevant outcomes for their own practice, as was the case in half of the studied projects. The teachers who participated in the studies used results, insights, or materials from research in their teaching practice. This can be considered a form of evidence-informed practice, as these teachers made well-informed decisions to alter their practice (Nutley et al., 2007).

This study also defined some enablers and constraints for knowledge mobilization, as perceived by participants of the subsidized research projects. A noticeable enabler concerns the active involvement of participants in research (e.g., as teacher-researchers or in designing and developing (teaching) materials). Another enabler was the broader dissemination of knowledge with the aid of partners who have a broader reach, particularly teacher education programs. A third, frequently mentioned enabler was connecting to (existing) needs (e.g., by using concrete examples in knowledge mobilization activities). A fourth enabler was involving others (outside the project participants) at an early stage, as this provides more opportunities to share knowledge with them. We acknowledge that in the Dutch context there may also have been an influence of the policies of the Dutch Research Council who actively supports collaboration between research and practice by, for example, requiring researchers to collaborate with practitioners (schools) in consortia, and demanding from consortia to describe the way they come to joint research questions and approaches.

Constraints for knowledge mobilization mostly concern a lack of prioritization in school and the absence of time. Teachers also sometimes lack the necessary knowledge or skills to participate in research. Research on barriers to knowledge mobilization outside the educational field also mentions the importance of a shared language and terminology (e.g. Carlile, 2002; Harvey et al., 2015). Although this was not found in the current study, this may be a point of interest.

4.1. Limitations and directions for future research

This study has its limitations. The first refers to the data sources, which offered limited insight into the outcomes of knowledge mobilization. Future studies may want to follow research projects more closely and use other data sources (e.g., interviews with end users) to gain a better understanding of the outcomes of knowledge mobilization. A longitudinal approach might be of interest to map outcomes of knowledge mobilization in the long-term.

A second limitation of this study relates to studying knowledge

mobilization strategies and outcomes in projects that were completed some years ago because that may have influenced the quality of the data. It may be interesting for future studies to monitor research projects in real time to observe knowledge mobilization during projects and directly after they are finished.

4.2. Implications

This study confirms the importance of teacher-researcher collaboration for knowledge mobilization. Future collaborations may want to reflect in advance on the role of researchers and teachers in relation to knowledge mobilization strategies, and they may want to consider collaborating with teacher education institutes (since they have a broad influence on practice). While collaborating, researchers and teachers could be more aware of the enablers and constraints for knowledge mobilization at different levels. These enablers and constraints can also be taken into account in the training of researchers and by practitioners and researchers working together in research-practice partnerships. Up till now, (beginning) researchers are mainly trained in methodological approaches but not so much in how to disseminate their findings or to collaborate in research-practice partnerships and mobilize their knowledge.

There is a need for effort by project participants to overcome obstacles that hinder knowledge mobilization (Levin, 2013; Van Schaik et al., 2018). It could be helpful for project participants to see knowledge mobilization as a social practice in which dialogue and negotiation on needs, goals, and communication are part of the collaboration process (Schenke et al., 2016). Research councils and funding agencies can encourage research consortia to clarify the roles of parties involved in the consortia and the knowledge mobilization strategies. In addition, research councils and funding agencies can encourage research consortia to report more in-depth and comprehensively on knowledge mobilization in their project by, for example, using a variation of the GRIPP2 model (Staniszewska et al., 2017). In addition, they can encourage continuous dialogue about enablers and constraints in the knowledge mobilization process in their monitoring of research projects.

CRediT authorship contribution statement

Katrijn Opstoel: Conceptualization, Formal analysis, Investigation, Writing – original draft. **Edwin Buijs:** Formal analysis, Investigation, Writing – review & editing, Conceptualization. **Janneke van der Steen:** . **Wouter Schenke:** Conceptualization, Formal analysis, Investigation, Writing – review & editing. **Wilfried Admiraal:** Conceptualization, Validation, Writing – original draft, Writing – review & editing. **Helma Oolbekkink-Marchand:** Conceptualization, Funding acquisition, Supervision, Validation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijedro.2024.100355.

References

Broekkamp, H., Vanderlinde, R., van Hout-Wolters, B. H. A. M., & van Braak, J. (2009). De relatie tussen onderwijsonderzoek en onderwijspraktijk verkend in Nederland en Vlaanderen [Investigations into the relation between educational research and practice in the Netherlands and Flanders]. *Pedagogische Studiën, 86*(1), 313–320. Retrieved November 1, 2022, from https://pedagogischestudien.nl/search?identifier=be2a427d-b2b3-4665-a229-5db991ab5c8b.

Carlile, P. R. (2002). A pragmatic view of knowledge and boundaries: Boundary objects in new product development. *Organization Science, 13*(4), 442–455. https://doi.org/10.1287/orsc.13.4.442.2953

Castelijns, J., & Vermeulen, M. (2017). Benutting van kennis uit onderzoek [Utilizing knowledge from research]. *Tijdschrift voor lerarenopleiders, 38*(2), 19–30. Retrieved November 1, 2022, from https://registratiesite.brlo.nl/home/nl-nl/shop/media/item/151/benutting-van-kennis-uit-onderzoek.

Coburn, C. E., & Penuel, W. R. (2016). Research–practice partnerships in education: Outcomes, dynamics, and open questions. *Educational researcher, 45*(1), 48–54. https://doi.org/10.3102/0013189X16631750. https://doi-1org-1t1dk4eo008df.stcproxy.han.nl/

Cooke, J., Langley, J., Wolstenholme, D., & Hampshaw, S. (2017). Seeing" the difference: The importance of visibility and action as a mark of "authenticity" in co-production; Comment on "collaboration and co-production of knowledge in healthcare: Opportunities and challenges. *International Journal of Health Policy and Management, 6*(6), 345. https://doi.org/10.15171/ijhpm.2016.136

Davidson, K., & Nowicki, E. (2012). An exploration of the utility of a knowledge utilization framework to study the gap between reading disabilities research and practice. *Alberta Journal of Educational Research, 58*(3), 330–349. https://doi.org/10.11575/ajer.v58i3.55626

Ellett Jr, F.S. (2012). Practical rationality and a recovery of Aristotle's 'Phronesis' for the Professions. In: A. Pitman, & E. A. Kinsella (Eds.), *Phronesis as professional knowledge: Practical wisdom in the professions* (pp. 13–34). Sense Publishers.

Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., et al. (2006). Lost in knowledge translation: Time for a map? *Journal of Continuing Education in the Health Professions, 26*(1), 13–24.

Greenhalgh, T., Jackson, C., Shaw, S., & Janamian, T. (2016). Achieving research impact through co-creation in community-based health services: Literature review and case study. *The Milbank Quarterly, 94*(2), 392–429. https://doi.org/10.1111/1468-0009.12197

Harvey, G., Marshall, R. J., Jordan, Z., & Kitson, A. L. (2015). Exploring the hidden barriers in knowledge translation: A case study within an academic community. *Qualitative Health Research, 25*(11), 1506–1517. https://doi.org/10.1177/1049732315580300

Ion, G., & Iucu, R. (2014). Professionals' perceptions about the use of research in educational practice. *European Journal of Higher Education, 4*(4), 334–347. https://doi.org/10.1080/21568235.2014.899154

Ion, G., Stîngu, M., & Marin, E. (2019). How can researchers facilitate the utilisation of research by policy-makers and practitioners in education? *Research Papers in Education*, 34(4), 483–498. https://doi.org/10.1080/02671522.2018.1452965.

Jones, S. L., Hall, T., Procter, R., Connolly, C., & Fazlagić, J. (2022). Conceptualising translational research in schools: A systematic literature review. *International Journal of Educational Research, 114*, Article 101998. https://doi.org/10.1016/j.ijer.2022.101998

Knott, J., & Wildavsky, A. (1980). If dissemination is the solution, what is the problem? *Knowledge, 1*(4), 537–578. https://doi.org/10.1177/107554708000100404

Landry, R., Amara, N., & Lamari, M. (2001). Utilization of social science research knowledge in Canada. *Research Policy, 30*(2), 333–349. https://doi.org/10.1016/S0048-7333(00)00081-0

Levin, B. (2013). To know is not enough: Research knowledge and its use. *Review of Education, 1*(1), 2–31. https://doi.org/10.1002/rev3.3001

Lysenko, L. V., Abrami, P. C., Bernard, R. M., Dagenais, C., & Janosz, M. (2014). Educational research in educational practice: Predictors of use. *Canadian Journal of Education/Revue Canadienne de l'éducation, 37*(2), 1–26. Retrieved November 1, 2022, from https://journals.sfu.ca/cje/index.php/cje-rce/article/view/1477.

McGeown, S., Oxley, E., Ricketts, J., & Shapiro, L. (2023). Working at the intersection of research and practice: The love to read project. *International Journal of Educational Research, 117*, Article 102134. https://doi.org/10.1016/j.ijer.2022.102134

Meijer, P. C., Oolbekkink, H. W., Meirink, J. A., & Lockhorst, D. (2013). Teacher research in secondary education: Effects on teachers' professional and school development, and issues of quality. *International journal of educational research, 57*, 39–50. https://doi.org/10.1016/j.ijer.2012.10.005

Miller, B., & Pasley, J. (2012). What do we know and how well do we know it? Identifying practice-based insights in education. *Evidence & Policy, 8*(2), 193–212. https://doi.org/10.1332/174426412X640081

Nilsen, P. (2015). Making sense of implementation theories, models, and frameworks. *Implementation Science, 10*(53), 53–79. https://doi.org/10.1186/s13012-015-0242-0

Nutley, S. M., Walter, I., & Davies, H. T. (2007). *Using evidence: How research can inform public services.* Policy press.

Schenke, W., van Driel, J. H., Geijsel, F. P., Sligte, H. W., & Volman, M. L. (2016). Characterizing cross-professional collaboration in research and development projects in secondary education. *Teachers and Teaching, 22*(5), 553–569. https://doi.org/10.1080/13540602.2016.1158465

Sjölund, S., Lindvall, J., Larsson, M., & Ryve, A. (2022). Mapping roles in research-practice partnerships–a systematic literature review. *Educational Review*, 1–29. https://doi.org/10.1080/00131911.2021.2023103

Staniszewska, S., Brett, J., Simera, I., Seers, K., Mockford, C., Goodlad, S., et al. (2017). GRIPP2 reporting checklists: Tools to improve reporting of patient and public

involvement in research. *Research Involvement and Engagement, 3*(13), 1–11. https://doi.org/10.1186/s40900-017-0062-2

Vanderlinde, R., & van Braak, J. (2010). The gap between educational research and practice: Views of teachers, school leaders, intermediaries and researchers. *British Educational Research Journal, 36*(2), 299–316. https://doi.org/10.1080/01411920902919257

Van Schaik, P., Volman, M., Admiraal, W., & Schenke, W. (2018). Barriers and conditions for teachers' utilisation of academic knowledge. *International Journal of Educational Research, 90,* 50–63. https://doi.org/10.1016/j.ijer.2018.05.003

Weiss, C. H. (1979). The many meanings of research utilization. *Public Administration Review, 39*(5), 426–431. https://doi.org/10.2307/3109916