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Working on boundaries: linking research and practice

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Abstract

Purpose – The aim of this study is to investigate how educational researchers work together with practitioners in practical research projects.
Design/methodology/approach – Mixed-method.
Findings – Our findings suggest that researchers recognize their own limitations as well as those of practitioners and policy makers and learn from collaboration, but that they lack ideas on what activities they can undertake to overcome limitations. Furthermore, educational researchers emphasize the importance of continuous and systematic organized exchange with educational practitioners. We discuss the needs and challenges of educational researchers interacting with educational practitioners during their research.
Originality/value – We believe that sustainable research and practice partnerships (RPPs) provide a more effective platform for collaboration between researchers and practitioners. This is because long-term engagement in cross-boundary work within these partnerships promotes the development of new knowledge, routines and methods, thereby improving educational practice. Unfortunately, there are few RPPs in Germany (the context of the researchers interviewed). Consequently, it is critical that funding policies, particularly outside the United States, provide greater support for RPPs and the necessary resources for these partnerships. Even if funding for RPPs is not always possible, our research suggests that short-term collaborative agreements in research-practice projects are preferable to relying on informal transfer channels.

Keywords Boundary, Research collaboration, Mixed-method
Paper type Research paper

1. Introduction

Evidence-based education has been the guiding principle of the international education debate in recent decades (Hammersley, 2003; Clegg, 2005; Slavin, 2008, 2020; Schrader, 2014). The premise is that educational practice and policy [1] should be based on evidence produced by educational research when designing educational programs and practices. While educational policy refers to the guidelines and measures formulated by policy makers to organize and fund educational systems, educational practice encompasses the concrete application of pedagogical methods and concepts in everyday education. Teachers and principals are among the main actors in educational practice. When we talk about educational practitioners, we mean the pedagogical actors in educational institutions, such as schools. In educational research, researchers and scientists investigate teaching and learning processes, structures and the results of educational processes over the course of a person's life (Prenzel, 2005). The terms researcher and scientist are used synonymously here.

Overall, two strategies of evidence-based education can be summarized. The first strategy focuses on the criterion of the effectiveness of educational programs to improve educational

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practice (Burkhardt and Schoenfeld, 2003). Evidence is understood as empirical proof that is determined using systematic and valid methods. Proponents argue that educational practitioners could learn from research findings obtained through such randomized field studies (Slavin, 2008). In contrast, critics point out that controlled experiments are unsuitable for the complex social realities of educational contexts (Hammersley, 2003; Biesta, 2007). However, educational research sees itself as a science of action that generates research knowledge not only about but also for practice (Schrader, 2014). Studies on the use of research knowledge in educational practice show that teachers and school staff rarely draw on research knowledge and often leave it unused (Stark, 2017). Further studies show that teachers' engagement with evidence can lead to better outcomes for teachers and students (Malin and Rind, 2022). Even though educational research provides research knowledge, it is ultimately educational practitioners themselves who decide whether to use evidence to change their actions (Hetfleisch *et al.*, 2017). Factors influencing the use of research knowledge are individual characteristics of educational actors, the structures and cultures of educational institutions, and the communication between researchers and educational practitioners (van Schaik *et al.*, 2018).

The second strategy is aimed at collaboration between research and practice in order to take practical problems into account in research projects. The collaboration between educational research, practice and policy differs in in its design (Froese *et al.*, 2014; Mohajerzad and Schrader, 2022). In this context, collaboration refers to targeted partnerships or networks that aim to bridge the gap between research and practice. This type of collaboration refers to coordinated and systematic interaction between different actors to achieve common goals. These actors can be practitioners, researchers, policy makers and other relevant stakeholders. In the US context, the concept of research-practice partnerships (RPPs) is dominant as a format for collaboration between research and practice (Sjölund *et al.*, 2022). RPPs are long-term collaborations between practitioners and researchers organized to study problems of practice and solutions to improve schools and school districts (Coburn and Penuel, 2016). RPPs aim to enable greater use of research in decision-making, address persistent problems of practice, and improve educational outcomes.

There are few long-term collaborations in Germany; instead, trialogues between science, practice, and policy are offered as one-time or short-term events (Mohajerzad *et al.*, 2021). For example, the Federal Ministry of Education and Research's Digitization in Education funding line mandates collaboration between researchers and practitioners, but project approval periods are limited to three years, which do not include long-term RPPs (BMBF, 2017). Thus, although the German Institute for Adult Education – Leibniz Center for Lifelong Learning recently launched a long-term science-practice network (DIE, 2021), overall, there are few RPPs in Germany. Collaborations between researchers, practitioners, and policy-makers in Germany tend to take place on a short-term basis in research projects. Such collaborations between researchers and practitioners take place in research projects, less often in partnerships or networks. From a social science perspective, there is evidence that different types of collaborations exist in research projects, e.g. binding (formal structure) but also loose contracts (informal structure) are concluded when researchers and educational practitioners work together in research projects (Froese *et al.*, 2014). Project collaboration takes on both informal and formal structures, with a preference for the use of informal structures, which are characterized by their unsystematic and flexible nature (Froese *et al.*, 2014). However, exactly how formal and informal collaboration is organized in research projects is an empirical question that we will address in the first research question.

Examining the structures of short-term collaborations in educational research projects is valuable because it enables stakeholders to maximize efficiency, adapt to changing circumstances, facilitate knowledge transfer, optimize resource allocation, enhance communication, and inform educational policies (McGeown *et al.*, 2023). This understanding

is particularly relevant in contexts such as Germany, where long-term research and practice partnerships (RPPs) are less common, and short-term collaborations play a vital role in advancing educational research and practice.

Our study focuses on the role of collaboration in short-term project collaboration to communicate science to practice. Research collaborations or research-practice partnerships are discussed as a promising approach to improve the use of evidence in practical decision-making in education, and there is a need for studies on their conditions for success and outcomes (Coburn and Penuel, 2016; Wentworth *et al.*, 2017). Examining the structures of short-term collaborations in educational research projects holds practical value due to the limited empirical knowledge available about the activities of education researchers who are engaged in collaborative projects other than RPPs. Understanding the structures and challenges of short-term collaborative projects provides valuable insights into this less-explored area of educational research. Although research on RPPs has been conducted, there are few studies on partnerships in research projects characterized by their brevity. Research projects, which represent an important basis for knowledge mobilization, are applied for and carried out by educational researchers, therefore the focus is on the educational researchers themselves. However, all of the research projects examined come from the same funding line and may imply a certain homogeneity with regard to the topics, methods and objectives of the research projects. This is due to the fact that funding lines generally set certain research priorities that result from the objectives of the funding institution.

The structure of this paper is organized into four distinct sections. The initial section offers a theoretical rationale for employing concepts of boundary negotiation and associated learning mechanisms. The subsequent second and third sections delineate our bifurcated mixed methods approach. Conclusively, the findings are elaborated upon and critically examined in the final section.

2. Learning mechanisms at boundaries

Various papers suggest that research and practice should be viewed as a potential field of knowledge exchange, rather than an assumed linear process of transfer from research to practice (Coburn and Stein, 2010; Edwards and Stamou, 2017; Hartmann and Decristan, 2018). Some learning theories argue that bridging boundaries between different fields of knowledge can create transformative learning opportunities. Collaboration at such interfaces can contribute to the reshaping and deeper understanding of practices (Engeström, 2001). Boundary crossing is a process in which individuals enter unknown territories in which they are unfamiliar and thus partially unqualified (Suchman, 1993). Nevertheless, these boundaries offer the opportunity to bridge existing breaks in action, especially if the transition is successfully mastered (Hartmann and Decristan, 2018). Akkerman and Bakker (2011) argue that crossing boundaries is a central part of learning and knowledge development because by connecting different knowledge domains, perspectives, or social contexts, people can generate new ideas, insights, and innovations. Boundary crossing thus enables the transfer of knowledge, the sharing of perspectives, and the building of bridges between different domains. The authors identify four dialogic learning mechanisms that occur at boundaries: Identification, Coordination, Reflection, and Transformation.

The mechanism of identification refers to the process by which actors understand what different practices or approaches are about in relation to each other. It also involves identifying commonalities and differences between different knowledge domains or social groups and how these different knowledge domains are interconnected (Akkerman and Bakker, 2011). Science requires resources, prestige and reputation, trust, and a safe environment to function. Politics needs knowledge, legitimacy and acceptance, relief, and reduction of complexity and attribution of competence. Pedagogical practice needs, among

other things, solution proposals for everyday problems and action recommendations (Schrader, 2014). The mechanism of identification helps us understand how scientists delineate and define their discipline and activities (Gieryn, 1983). By strategically setting boundaries, they can secure their authority and legitimacy, but also exclude certain perspectives and approaches. The use of journals and specific semantics leads to an external closure and thus a distinction between researchers and practitioners (Weingart, 2010). These different professional identities, which include researchers and practitioners (Wenger, 1999), make the transfer of research findings into educational practice challenging as they need to cross professional boundaries between educational research and practice. Studies that establish a connection through interpersonal contact between representatives of both fields emphasize the need for negotiation at boundaries through interactions and communication (Nutley *et al.*, 2007). The negotiation of boundaries between researchers and practitioners occurs continuously (Gieryn, 1983). This process can determine to what extent the scientific system should adapt to external requirements without giving up its own boundaries (Weingart, 1998, 2001). Thus, identification processes allow researchers to consider the needs of practitioners by, for example, including them in the development of their research question (Froese *et al.*, 2014).

Coordination can lead to collaborative and routinized exchange by providing a structure within which different practices can interact efficiently. This is done by creating a common language and processes that standardize and simplify communication between stakeholders. Coordination usually takes place between practices in different organizational settings, such as between educational researchers and teachers. Although coordination is fundamentally about collaboration and can be described as collaborative, other factors such as top-down decision making and the nature of stakeholder involvement are also important. These factors can influence the dynamics and degree of collaboration (Akkerman and Bruining, 2016). The potential of the coordinative mechanism lies not in reconstruction but in overcoming the boundary in the sense of establishing a continuity that allows for future and effortless movement between different sites. In project structures, Froese *et al.* (2014) advocate the proactive planning of explicit phases for translation work and the establishment of a shared language. Typically, interaction with practitioners occurs toward the project's conclusion in preparation for the subsequent knowledge utilization. However, by means of effective coordination, it is feasible to prearrange explicit phases encompassing identification, reflection, and transformation, which unfold during the initial, intermediate, and final phases of the projects. Otherwise, there is a high risk that activities will be hindered or even prevented due to lack of time and resources (Froese *et al.*, 2014, p. 13). A continuous and systematic exchange between researchers and practitioners or policy-makers enables the provision of practice-relevant and valid knowledge that promotes transfer (Bergmann and Schramm, 2008).

The other two learning mechanisms at boundaries are reflection and transformation. Reflection involves broadening one's perspective on practices by reflecting on and critiquing one's assumptions, values, and perspectives (Akkerman and Bakker, 2011). Through reflection, perspective formation and adoption can be achieved, leading to new insights and deeper understanding (Boland and Tenkasi, 1995). Akkerman and Bruining (2016) show that reflection refers to the rethinking and questioning of existing practices, often triggered by the realization that existing methods or approaches are inadequate. Such reflection processes in research practice projects resulted in a transformation of research culture and practice (Akkerman and Bruining, 2016). Transformation refers to collaboration and the joint development of (new) practices. It involves challenging and altering existing practices in response to problems or challenges, resulting in a realignment of practices to meet common problem areas. This process is not about entering an open space where anything goes but rather entails deliberate changes and adaptations to improve current practices or develop

new solutions (Akkerman and Bakker, 2011). This involves experimenting with and reshaping practices to develop innovative solutions or approaches. Transformation processes strengthen the relationships between the stakeholders and lead to a changed research agenda that is defined by the stakeholders at the boundaries themselves. These processes also contribute to greater involvement and participation in future decisions (Akkerman and Bruining, 2016).

In sum, identification aims to construct and reconstruct boundaries, while the other mechanisms are more concerned with overcoming boundaries (Akkerman and Bakker, 2011). Identification and reflection mechanisms are about identities and perspective taking. In contrast, both coordination and transformation reflect more practice-based learning processes as they focus on activities. Finally, the coordination mechanism contrasts with transformation as it reflects a smooth, effortless, and routine process in which people or objects move back and forth between practices. The latter, on the other hand, involves confrontations and continuous joint work.

Studies show that the learning mechanisms of identification, reflection and coordination emerge in different settings such as research projects in schools, networking activities and professional development (Hartmann and Decristan, 2018) and take place at different stages at institutional, interpersonal and intrapersonal levels, with coordination taking place at all three levels (Akkerman and Bruining, 2016). Transformation is only realized in settings that make it possible to establish forms of joint project work in which researchers and practitioners discuss with each other (Hartmann and Decristan, 2018), and transformations only take place in later years mainly at the intrapersonal level (Akkerman and Bruining, 2016).

3. Research question

Some funding lines of educational research projects in Germany emphasize that researchers and practitioners collaborate in research projects, i.e. educational practice can be involved in the whole process of research projects – research questions and research needs are developed in exchange between practice and research, and solutions are tested in practice and then implemented (Reeves, 2006; Euler, 2014). Such collaboration can be observed, for example, in design-based research. In close exchange with practice, researchers even change their research strategy to produce knowledge relevant to practice (Penuel *et al.*, 2020). However, it has also been shown that researchers in research projects either exchange informally with practitioners or or collaborate in formal structures on parts of the project (Froese and Mevissen, 2016). However, given the limited understanding of the differences between formal and informal communication structures to date (Froese *et al.*, 2014), our first research question is formulated as follows: What are the differences between research projects that use formal communication structures for collaboration with practitioners, and research projects that engage in informal exchanges with educational practitioners (RQ1)? To address research question 1 (RQ1), we adopted an explanatory sequential mixed-methods design, as proposed by Creswell and Clark (2017). Our deliberate choice of an explanatory sequential design serves the purpose of not only investigating distinctions among various categories of research projects but also offering a more profound understanding of the structuring of interactions within these projects.

Finally, in the qualitative component of our study, we also aim to investigate the perspectives of educational researchers on boundary work during their collaboration with educational practitioners and policymakers in projects. Little is known about the experiences of educational researchers in short-term practice research projects. In light of this gap, the purpose of this study is to analyze how challenging contextual differences are handled. Therefore, the second research question is as follows: How do educational researchers learn at boundaries in projects that involve short-term collaborations with practitioners (RQ2)?

4. Method

The study used a mixed-methods approach (Creswell and Clark, 2017) that included two components: online surveys and focused interviews. This approach, which combined quantitative analysis of items with qualitative analysis of conducted interviews, reflects both our interest in how practice-research project structures differ and the opportunity through the interviews to delve deeper into researchers' experiences and clarify what challenges they have faced in practice-research projects and what strategies of boundary work and boundary crossing they have used. Fifty research projects in the same funding line of the Federal Ministry of Education and Research were surveyed in the first step by means of an online survey. Following the online survey (n = 94), an interview study was conducted with 15 researchers. The study procedure was approved by the local ethics committee (the name of the ethics committee has been removed for blind review). The participants provided their written informed consent to participate in this study.

4.1 Sample

4.1.1 Online survey. Research projects belonging to the same funding line on digital education in Germany were asked to participate in an online survey consisting of three waves, with each wave taking place at a specific point in time (beginning of the research project, middle of the research project, end of the research project).

In the following, selected results of the second wave of the survey are presented. In total, 28 research projects in one funding line on the topic of digitization in education were asked to participate in the survey. A large proportion of these research projects are collaborative projects consisting of several subprojects. Therefore, project leaders and research staff from 50 research subprojects were asked to answer the questions in the survey. A total of 94 researchers participated in the survey. As part of the data analysis, the data were aggregated on the level of each research project: If the survey questions were answered by multiple individuals per research project, the respective responses were aggregated by calculating the mean for each item. Irrespective of whether the questions were answered by the project leaders or by the regular scientific staff, each response was weighted equally when calculating the means for each project. If a project consists of multiple subprojects, we initially calculated the means for each subproject and then computed the mean of the whole project using the results of the subprojects. To ensure that larger subprojects do not have a comparatively larger influence on the mean of a research project than smaller subprojects, we weighted each subproject equally.

4.1.2 Focused interviews. Once data were available for all 50 subprojects, guided interviews were conducted with 15 researchers between July and October 2021. Of the 94 researchers in the online survey, a group of 20 researchers were invited to participate in the follow-up survey on boundary work. Using data from the online survey, 20 education researchers were selected from 5 education sectors (early childhood education, school education, teacher education, vocational education, and adult education) and informal or formal project structures. In addition, for each educational sector, an attempt was made to survey both project leaders or professors and research assistants. However, only 15 interviews could be conducted because five researchers declined to participate in the study. In total, we interviewed six educational researchers, two school psychologists, two psychologists, and two business educators. The remaining three interviewees belonged to the disciplines of social sciences, business informatics, and communication and political sciences. Of the 15 researchers interviewed, 8 were men and 7 were women. Two-thirds of the respondents were part of an interdisciplinary project and one-third were part of a noninterdisciplinary project. All projects were funded for a three-year period. The projects examined different areas of education (Table 1): Four of the respondents examined vocational

	Frequency in percent
Education sector	$n = 15$
Early childhood	3
School	2
Teacher	3
Vocational school	4
Adult	3
Exchange with practitioners	$n = 15$
Formal structures	8
Informal structures	7
Position	$n = 15$
Research senior	7
Research assistant	8

Source(s): Author's own work

Table 1. Overview of the interview participants

education, three examined adult education, three examined teacher education, three examined early childhood education, and two examined school education. Approximately half of the respondents (53%) were research assistants, and the other half (47%) were project directors or professors in education research. All participants were university researchers. Eight respondents indicated that parts of the project involved collaborative work with practitioners, while seven indicated that informal exchanges took place. Researchers that were interviewed cited different methods and research designs used in the project. Standardized (online) surveys, qualitative interviews, and group discussions were frequently mentioned; experimental studies and diary studies or filming of video clips were also occasionally conducted.

4.2 Items of the quantitative part

The items we analyzed for this study are presented as follows: The first item ("Research project type"), which is relevant for this study, refers to the different forms used by researchers within the research project to communicate or cooperate with pedagogical practice. In this survey, we focus on two of the items´categories: joint implementation of work packages within the research projects and informal exchange. Four additional items related to the researchers' perceived impacts of the collaboration between the researchers and educational practitioners. These four items were measured on a 4-point Likert scale. We asked participants to rate (1 = strongly disagree; 4 = strongly agree) whether interactions with educational practitioners 1.) helped the researchers to apply their research knowledge to educational practice, 2.) helped the researchers to recognize where knowledge mobilization was unsuccessful, 3.) changed the researchers' research strategy, and 4.) helped the researchers identify research gaps.

4.3 Category scheme and analysis of the qualitative part

The interviews were transcribed and analyzed with the help of a focused interview analysis (Kuckartz and Rädiker, 2020). The software MAXQDA was used, which enables the coding and content evaluation of relevant text segments. To investigate RQ1 a category system was developed to record the *design of the exchange between research and practice or politics*. This category is divided into four subcategories: (1) the subcode *Actors* (which classifies whether the exchange took place with practice or with politics), (2) the subcode *design of the research question* (more precisely, whether it was *derived from research or literature*, or whether *practice was involved*), (3) the subcode *time and frequency of the exchange* (whether this took

place right *at the beginning* of the project, as well as whether it took place *more occasionally and loosely* or *more regularly and intensively*), and (4) the subcode *involvement of the practice*, which determined whether the practice partners only participated in the project, mainly through *feedback and discussions*, or whether they were additionally involved in *organizational processes*.

To answer the second research question, the category of *boundary* was formed, because the implicit negotiation of boundaries between the contexts of science and practice is a way to deal with the differences. For this purpose, the category of contextual differences was formed deductively. The category of *contextual differences* refers to the different goals and interests of the individual actors from the different functioning of science, practice, and politics. This category was divided into *differences between science and practice*, *differences between science and politics*, and *differences between politics and practice*. Based on the theory, the codes (1) *identification*, (2) *reflection*, (3) *coordination*, and (4) *transformation* were formed. The interviews were double-coded by two persons independently of each other. Subsequently, a check of the intercoder agreement (Mayring, 2015) was carried out by the MAXQDA program. The code overlap on segments was 90%, and a kappa value (Brennan and Prediger, 1981) of 0.71 was achieved. According to Landis and Koch (1977), this corresponds to a remarkable agreement. Finally, the coding of the different segments was discussed and a consensus was reached.

5. Results

5.1 Informal and formal project structures

The results of the evaluation of research question one (RQ1) are presented in Table 2. They illustrate that researchers in research projects, where educational practitioners work together through formal communication structures, are more likely to report that the research has been transferred to educational practice than researchers who only informally exchange with practitioners. To indicate the difference between these two groups, we calculated Cohen's d effect size. Cohen's d makes it possible to compare the means of two groups and to name their effect sizes (Cohen, 1988). The sample we analyzed also represents the total population since we surveyed all research projects from the funding line (name of the funding line) for the online survey. Thus, the calculation of statistical significance is not purposeful because we do not have a sample that we would infer to the total population. Calculating the effect size is

		Effects of the exchange with persons from pedagogical practice			
		Apply research knowledge to practice	Knowledge mobilization unsuccessful	Change of research strategy	Identification of research gaps
Research projects in which researchers work together with pedagogical practitioners on parts of the project	Mean	2.87	2.84	2.01	2.88
	Standard deviation	0.94	0.81	0.76	0.80
Research projects that use informal exchange only	Mean	2.32	2.15	1.48	2.68
	Standard deviation	1.39	0.89	0.45	1.36
Cohen's d		−0.46	−0.81	−0.86	−0.18

Table 2. Study 1 results

Source(s): Author's own work

therefore a more appropriate approach. The Cohen's d effect size is small at 0.46. Researchers involved in projects with formal communication structures more often report that knowledge mobilization fails through the exchange with practice compared to researchers who only engage in informal exchanges with practice within their research project (Cohen's d = 0.81, a large effect). In addition, there is a difference between the two project types in terms of a change in research strategy as a result of the exchange. Cohen's d effect size is large at 0.86. Finally, there is no difference between the two project types in the discovery of research gaps, whereby Cohen's d effect is also very small (0.18).

To answer RQ1, in addition to the survey, qualitative interviews were conducted with researchers in research projects with formal structures that link practitioners to project components and researchers in research projects that engage in informal exchange with practitioners. Overall, the exchange with practice partners played a greater role than the exchange with political actors for all researchers interviewed. All respondents stated that an exchange with practice partners had taken place and that the exchange was mostly described as regular and intensive. In contrast, 11 respondents stated that an exchange with political actors had taken place and more often described this contact as loose or irregular. In none of the projects did practitioners participate directly in the research.

5.1.1 Research projects with formal communication structures for collaboration with educational practice. Researchers who have formal project structures to work with practitioners on the research project report that exchanges with practitioners took place at the beginning of the project. They report that they have involved practitioners in the discovery of the research question, while grounding their research question in the state of the research and literature or theories. Although the discovery of research questions is dominated by a view of practice or even collaboration with practice, the justification of research questions, i.e. the decision on the choice of theories and methods, remains the sole responsibility of the researcher. In such research projects, practitioners were sometimes contractually bound as cooperation partners and had to participate, especially in organizational processes such as planning project meetings or acquiring further pedagogical practitioners. The practitioners also contribute to the research process through feedback and discussions. Since the practitioners are contractually bound to the project, the researchers report that sufficient time and resources were provided by the practitioners. However, they complain that in the project, there are many obstacles to exchanging with politics:

> Whereby the obstacles are of course always great in politics. You talk a lot, but very little can actually flow in, because the structures are also very rigid, the funding pots are very rigid (Interviewee 3, Item 12). [2]

5.1.2 Research projects with informal exchange with practitioners. In research projects in which the researchers stated that they only had an informal exchange with practitioners, there were no reports of compatible cooperation. Only three out of seven respondents reported an exchange that had already taken place at the beginning of the project. None of the researchers mentioned the practice when discovering the research question. These researchers state that they referred to the current state of research when discovering and justifying the research question. A large proportion of respondents reported that practice actors were involved in the research mainly through feedback, response, and discussion but not in organizational processes. Since these research projects do not have formal structures of practice formation, practitioners are more inclined to cancel appointments for an exchange: "And that is not at all malicious on their part. They are interested in doing it. However, I think that in the abundance of tasks they have there, it is simply not the top priority. In addition, that is why they do not deal with it first and foremost" (Interviewee 12, pos. 37). Researchers in these research projects would like to see a stronger institutionalization of the exchange

from politics: "What one could also consider, and this goes to the address of the funding body, is whether one should not initiate an accompanying group of actors, so to speak, from politics and from practice, and a regular exchange of the projects" (Interviewee 09, pos. 42).

5.2 Learning on boundaries: identification, reflection and coordination

A particular challenge of practice research projects can be attributed to contextual differences between research, practice, and policy. In our study, researchers mainly mentioned differences between research and practice ($n = 13$) but mentioned differences between research and policy less frequently ($n = 3$) and differences between policy and practice hardly at all ($n = 2$). The latter is mainly because few of the interviewed researchers reported in detail about an exchange with political actors. The lack of policy statements is because the researchers are engaged in practice-based research projects and thus have less focus on interacting with policy-makers and much more with educational practitioners.

5.2.1 Identity. The researchers were basically aware of the different functioning of the research and practice and thus of the different experiences of researchers and practitioners: "However, we are in a special position, we look at this practice from the outside as scientists, but the practitioners perhaps experience it quite differently" (Interviewee 05, pos. 8). In particular, the different interests and goals of the two groups in the context of the research-practice exchange were frequently reflected upon. The goals and interests of the researchers were primarily reflected as gaining knowledge, publishing results, and personal qualifications. The interviewees stated, "In terms of goals, it is difficult, because of course we have a different goal. Of course, I want to publish research results and exactly, keep them open for the scientific world (. . .)" (Interviewee 11, pos. 46), and: "However, I also know many colleagues from universities, for example, or other universities, who are more in the tunnel (. . .). So for them it is the research that counts" (Interviewee 06, pos. 45).

Moreover, the goals and interests of practice were identified primarily as outcomes for application, help and support in implementing research findings, development of learning materials, and easy-to-understand information by researchers, as shown below: "Yes, well, of course what the practice likes better is that we also implement things on the platforms, rather than just evaluate things" (Interviewee 01, pos. 41), and "(. . .) things like maybe a presentation, an info-sheet, and these are actually things that I had not originally thought about that also had to be done" (Interviewee 11, pos. 46).

When these different goals and interests clashed, challenges and conflicts arose in the collaboration: "Well, I do not think you can pretend that none of this is a problem, (. . .) they are fundamentally different interests" (Interviewee 09, pos. 38). Thus, specific responsibilities were frequently mentioned as potentially helpful ($n = 7$; in a total of 10 segments). One researcher described the need for resources as the primary challenge in identifying such a responsible person:

> Therefore, from the general case, you need people who care. So in our field there is a nice article that says: It's nobody's job to turn insight into impact. In addition, if it is someone's job, then it costs money and it costs care and so on, it costs appreciation for these tasks. In addition, that has to be organized somehow (. . .) (Interviewee 10, pos. 26).

Interviewed researchers also reported the difficulty of presenting research findings in an easily understandable way without losing scientific complexity: "Therefore, I know (. . .) how difficult it often is (. . .) to communicate empirical findings from science to practice and at the same time to do justice to the often complex empirical findings. However, also, to communicate the whole thing in an understandable way (. . .), and in such a way that one can do something with it in practice" (Interviewee 05, pos. 24).

Differences between science and politics also become apparent primarily through the different modes of operation and interests. One interviewee in particular was very critical of

the cooperation with political actors: "(. . .) they also have very specific interests. They do not want to spend money (. . .). In addition, of course there are certain legalities that do not correspond to what we have as educational goals" (Interviewee 03, pos. 20). For example, it is in the interest of the political actors to win elections: "What went badly recently (. . .) was that I had the impression that it was only election campaign material, people just said that something would come at some point, and then the government changed, the guidelines are gone" (Interviewee 03, pos. 20). Moreover, it is in the politicians' favor to save financial resources or to gain legitimacy:

> And we also notice that even when they bring in experts, they sometimes do not act like the best experts, but like the people who confirm what I have. In addition, that's what we often find with political measures, that some inaccurate evaluations are conducted, where you know exactly that the evaluation is not carried out appropriately. However, then you pat yourself on the back, and the result is supposed to be what you have actually already thought of yourself. That is a big problem, that politicians have their own focus, their own construct, which they want to be confirmed (Interviewee 03, pos. 20).

Overall, during their work with practitioners and policy-makers, researchers recognize the different goals and interests of practitioners and policy-makers and derive conditions from them, such as the specific allocation of roles and designation of responsibilities. At the same time, however, the education researchers emphasized that during boundary negotiations, the boundaries must ultimately be maintained:

> What it also takes is then actually also the courage to say okay, watch out. Our project is based on practical exchange. We cannot deviate from scientificity, but we have to adapt our scientific language a bit to the community of practice, for example (. . .) (Interviewee 15, pos. 26).

5.2.2 Reflection and perspective taking. Researchers have often both reflected on and broadened their own perspectives by proposing, for example, partial adaptation to the expectations and interests of practice as strategies for dealing with existing contextual differences. A discourse on the extent to which this adaptation should take place can be understood as a negotiation of the boundaries of the science and thus as boundary work, especially when practice is included in this discourse. Such attempts at negotiation were mentioned in a total of 60 segments ($n = 14$):

> And exactly in such a way I think that (. . .) must also be serious on the part of the researchers, to adjust to the conditions and needs from practice and to truly say, oh, no, we imagined that somehow differently. However, we understand that it does not work that way for you. We have to implement it in a different way, or we have to make other points important. That is, that we actually manage an exchange (Interviewee 07, pos 38).

Furthermore, many researchers have advocated taking practitioners' expectations for ease of understanding into account: "In any case, to have a document that should be publicly available, that should also be written in a comprehensible way, that should be written in a practical way. In addition, precisely, thereby (. . .) it is common to reach even more actors from the pedagogical practice (. . .)" (Interviewee 05, pos. 24). In addition, researchers reflect that practice journals and other channels should additionally be used as transfer, such as video platforms: "It might be worth considering (. . .) using video and video platforms such as YouTube, for example, and setting up channels there, because of course you can reach a (. . .) particularly large audience through them" (Interviewee 05, pos. 28). Moreover, an adaptation both on the linguistic level and on the level of the needs (and thus the interests) of the practitioners was suggested. For example, it was mentioned: "That you also listen and do not go in with your scientific style and say: I want to get something from you now. However, that in return you also ask exactly: What can we perhaps do for you or what are your needs?" (Interviewee 06, pos. 36). The interviewees were of the opinion that such an adaptation to

practice criteria would be beneficial not only to the practice partners but also for both sides. Furthermore, the interviewees made clear that boundary negotiations need to take place in mutual exchange between researchers and practitioners:

> We would need sensitization on both sides. For both sides, the practice must also be sensitized somewhere for science so that we approach something with other ideas, methods, and techniques. In addition, science must also be sensitized to the fact that practicality and, of course, corporate goals, etc., are somewhere in the foreground on the company side. Conversely, the practice must of course also see that the company's goals are not our scientific goals. In addition, I believe that this is something that can only take place through communication and exchange (Interviewee 08, pos. 36).

In summary, during practice research projects, researchers reflect on their perspectives and derive meaningful actions for practitioners to change and use themselves in their practice.

5.2.3 Coordination. To cross boundaries, collaborative and routinized exchanges take place between different practices by creating a common language and basis of understanding: "For me, language is a very decisive factor. So there is nothing worse than trying to go somewhere with the most scientific terms. That somehow has a deterrent effect" (Interviewee 06, pos. 16). Conversely, however, researchers who often remain at university after their studies and have little or no practical experience also lack knowledge about processes in practice: "There is simply so much experience and routines that have not yet arrived in science and politics, but which work in practice" (Interviewee 06, pos. 8).

The researchers believe that there should not only be cooperative and routine exchanges but also emphasized that the exchanges, which can take place in different formats, should be well organized:

> (. . .) They must of course have a platform or a network, a point of contact, in order to be able to meet at all, because this is not something that simply happens on the street, but it must be organized (Interviewee 14, pos. 44).

Moreover, according to the respondents, the exchange should be characterized by continuity: "(. . .) it also requires a certain (. . .) consistency in order to be able to accompany transfer offers in the longer term, that is important" (Interviewee 04, pos. 26). The planning of explicit phases of collaboration in the project was also considered important several times ($n = 5$; in a total of 5 segments). Very often ($n = 11$), it was emphasized that political actors should provide resources for both research and practice so that the coordination of collaboration succeeds: "So it is not only the resources for researchers but also for practice that are often missing or that would be necessary" (Interviewee 07, Item 36).

Looking at boundary activities from the researchers' perspective, there is a continued need for resources, such as time and organized platforms or networks, as well as a common language eye-to-eye. The latter is learned during such short-term practice-researchers' projects, but it is better thought of in long-term formats. For this, according to the researchers interviewed, there is a need for funding lines that enable infrastructures for long-term collaboration between researchers, practitioners, and policy-makers.

6. Discussion

The aim of this study was to investigate how educational researchers collaborate with practitioners and policy-makers in practice research projects. In line with previous studies (Edwards and Stamou, 2017; Hartmann and Decristan, 2018), these findings highlight the importance of viewing research and practice as a potential space for knowledge exchange, rather than a linear process of research influencing practice (Coburn and Stein, 2010). Collaborative approaches and the co-generation of knowledge are necessary to promote effective shared learning (Akkerman and Bakker, 2011). While our quantitative data addressed static analyses of differences between different types of research projects, our

qualitative data explored the design of different research projects and how they dealt with boundaries, providing a broader range of explanations of what frameworks are useful, and how educational researchers deal with their challenges. This study thus provides a synergy of quantitative and qualitative research for the literature on the relationship between educational researchers, practitioners, and policy-makers and makes a methodological contribution by using a mixed methods approach to examine the strategies and practices of educational researchers in projects with practitioners. The combination of survey data with interview data from the thematic analysis is particularly evident in the choice of an explanatory sequential design. This provides an opportunity to go beyond the purely quantitative results and explore not only the differences between research projects but also to gain a deeper understanding of how communication between researchers and practitioners is orchestrated in short-term projects.

While the quantitative data have shown, in line with Froese *et al.* (2014), that researchers who collaborate with practitioners within formal communication structures are more inclined to reflect on the challenges of knowledge mobilization than those who work informally with practitioners, and that researchers in research projects where educational practitioners are actively involved in parts of the project are more aware of successful knowledge mobilization than those who only have informal interactions with practitioners, the qualitative data allow us to explore the reasons for the higher success rate of knowledge mobilization in research projects where educational practitioners are involved in formal communication structures.

The findings of the qualitative component were supported by a more in-depth analysis of the interview study, which would shed light on the strategies and practices of the two types of research projects to exchange with practitioners, as we need to learn more about the qualities, structures and strategies to collaborate in other areas of educational research (McGeown *et al.*, 2023). Furthermore, our findings indicate that placement activities are usually characterized by high individual effort and commitment, sometimes in the absence of reliable institutional support systems (Hartmann and Decristan, 2018). This illustrates that it is primarily contracts and institutionalized activities within these projects that support the management of knowledge mobilization, which are more likely to be found in formal rather than informal project structures. This study also contributed to the literature on overcoming boundaries in educational practice research projects by analyzing and explaining the previously neglected perspective of educational researchers in short-duration projects (McGeown *et al.*, 2023). The qualitative data, for instance, reveal that while many of the projects acknowledge the importance of boundary work, there seem to be no concrete solutions for overcoming boundaries, even though the interview guide contained specific questions about solution strategies. Instead, the researchers engage in reflective thinking during their interviews.

Overall, the collaboration remains a pure exchange. Practitioners do not conduct research themselves: They do not learn scientific methods, as propagated by representatives of action research, for example. Therefore, the following question arises: Is it even necessary for practitioners to conduct research themselves? Would it even be realistic for practitioners to actively participate in research – are they willing and able to do so? From the interviews, it became clear that both sides should learn from each other, and not that all practitioners should suddenly become researchers. Indeed, researchers were very aware of the differences between research and practice. However, this awareness alone does not allow the differences to be overcome directly. The interviewed researchers suggested many strategies to overcome the boundaries between science and practice. Fundamentally, however, they also emphasized that the boundaries of the science should be preserved and not dissolved. This view confirms the structural gap that has always existed (Schrader, 2014). It should be noted, however, that the structural gap and collaboration between research and practice need not be mutually exclusive. Moreover, the study shows that researchers can recognize and reflect on

boundaries by taking the perspective of practitioners. However, there is little information remains for activities on how researchers can overcome the boundaries.

In line with other research, transformation as a learning mechanism requires intensive and, in most cases, long-term boundary work (Akkerman and Bruining, 2016; Edwards and Stamou, 2017; Hartmann and Decristan, 2018). Our study has revealed that the mechanisms of transformation are somewhat limited. Transformation involves reshaping existing practices, adapting research findings to real educational contexts, and jointly developing innovative solutions. It appears that researchers in short-term research projects have fewer opportunities to develop these transformation mechanisms compared to those involved in long-term RPPs. Transformations are more likely to arise through conflicts (Akkerman and Bakker, 2011). There seems to be a lack of time available in research projects with short-term collaborations. It is important to note that transformations have the potential to bring about positive changes in education. Therefore, it is advisable to consider these aspects even in short-term research projects.

Finally, there is obviously more and closer exchange between research and practice than between research and policy in the projects studied. Some of the interviewees "let it slip" that politics puts its own interests first (legitimation). In some cases, however, there simply seem to be fewer concrete plans for exchanges with policy-makers than for collaborations with practitioners. The fact that so few respondents talk at all about the process of exchanging with policy makes the results even less meaningful than the statements about exchanging with practice. Why this is so and what the implications are could be clarified in further research. Future studies should not only investigate the interactions between researcher-practitioner and researcher-policymaker, but also explore the relationships between policymaker-practitioner and other multi-layered, competing or complementary dynamic relationships. Such research could shed light on why there is less dialog with policymakers and what structural, cultural or institutional barriers influence this. By exploring these multiple interfaces, we could better understand how different sectors interact and what factors promote or hinder effective cooperation.

7. Limitation and implication

Despite the contributions of this study, there are some limitations that could be addressed in future research. First, a deductive approach was used in which the guiding interview questions were developed in relation to the category system. This may have resulted in other aspects going unmentioned. Second, narratives represent the perspectives and experiences of the participants. However, it is important to note that narratives do not necessarily equate to actual actions. This leads to limitations in the interpretation and transferability of the results. Thus, transfer activities may have been named in the narratives that may not have actually occurred in the projects. This can happen for various reasons, such as distortions in the memory of the interviewees, so it is advisable to conduct additional observational studies to be able to examine the actions as well.

The decision for teachers and researchers to engage at the boundary between educational research and practice is likely to be influenced by their communication structures, depending on whether they use formal or informal structures in research projects. Although researchers face numerous challenges, our findings can be seen as encouraging, highlighting the benefits of collaborative activities and the mutual learning that results from them. Our data suggest that learning at the interface through collaboration is an achievable goal, even when researchers, practitioners and policy makers face various obstacles. Similarly, this study shows that the learning mechanism of transformation is unlikely to emerge in research projects, as these are short-term in nature. We believe that long-term research and practice partnerships (RPPs) are better suited for researchers and practitioners to collaborate because

they learn more in a long-term perspective from their joint work on boundaries by developing new knowledge, routines, and ways of working that help improve educational practice (Farrell *et al.*, 2022). Unfortunately, there are few RPPs in Germany (where the researchers interviewed work), so funding lines in countries outside the United States should also provide more support for RPPs. Resources must be made available for RPPs, which means that funding policies must also focus on such strategies. However, funding is not always available for RPPs, so in line with our findings, short-term collaborative agreements in research practice projects are recommended rather than to using informal channels for transfer.

Notes

1. The terms educational practice and educational politics are used to refer to different constellations of actors that vary considerably between educational sectors. However, in educational science literature, the distinction is not clearly made, which is why the study focuses on practice but also refers to politics throughout.
2. The interviews were conducted in German. The interview excerpts are translated using the online machine learning translation service DeepL to ensure a certain degree of standardization and objectivity.

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