

REFLECTIONS AND OUTLOOK: STRATEGIES AND FUTURE DIRECTIONS FOR RESEARCH LITERACY IN TEACHING AND IN TEACHER EDUCATION

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Enhancing teachers' research literacy is a core requirement of formal contemporary teacher education in the TREL Nordic-Baltic consortium's programmes. The TREL project's collaborative framework provided a unique opportunity to observe and examine how research literacy is taught in pre-service teacher education. To further this goal, we have identified key strategies across three critical areas: 1) teaching research methods to pre-service teachers, 2) supporting in-service teachers conducting research in the classroom, and 3) sustaining TREL's momentum. By implementing these strategies, we aim to provide teacher educators, schools, pre- and in-service schoolteachers with guidance and support to explore their practice as a means for sustainable professional development. Additionally, providing pre-service teachers with insights into research methods ensures they are well-prepared to critically contribute to educational advancements. Finally, we hope that sustaining the momentum of the TREL project through ongoing partnerships and institutional support will further embed research literacy into the core of our educational systems.

1) Teaching Research Methods to Pre-Service Teachers

The programmes featured in this volume demonstrate diverse approaches to teaching research skills among pre-service teachers, each shaped by its own narrative. For instance, at Malmö and Gothenburg universities, the teaching

profession and research methodology are integrated into core courses that culminate in a final thesis. In contrast, Tallinn University adopts a model of stand-alone courses dedicated to research skills, covering both qualitative and quantitative methods. Other programmes offer separate research-focused courses with explicit instruction in these methods, supplemented by data collection and analysis workshops. Although the expected competencies vary – from conducting action research to mastering advanced statistical procedures – all programmes share a common conviction: engaging pre-service teachers in learning to do research is essential for cultivating reflective, research-engaged teachers. Such engagement may empower future teachers to critically examine and problematise the challenges they will face in their classrooms.

It is also important to acknowledge that teacher educators in every teacher education programme recognise the challenges pre-service teachers face in translating their theoretical research knowledge into practical teaching contexts. To illustrate, in Chapter 5's Latvia case, Karapetjana and Roziņa highlight the following: “Despite prior experience with bachelor's thesis writing, instructors and supervisors observe that students often struggle to articulate research goals and questions or to formulate a hypothesis – skills fundamental to any empirical research project.” (p. 102)

To overcome these challenges and motivate the application of research literacy in real-world settings, teacher educators emphasised the importance of making explicit connections between research activities and everyday classroom practice. This approach not only supports the development of a reflective practitioner identity but also fulfils the mandates of teacher education programmes. For example, Surkalovic et al.'s Chapter 1 highlights insights from OsloMet, where teachers pointed out the disconnect between research literacy and professional practice. They argued for greater emphasis on the developmental aspect of Research and Development, focusing on how research skills can meaningfully contribute to teachers' continuous professional development.

In Chapter 2, Nolan et al. observed that Malmö and Gothenburg student teachers are generally capable of linking their professional experiences with the academic and research components of their course work. However, they stressed that these connections do not occur automatically and require active facilitation by teacher educators to ensure these relationships are truly meaningful. As noted, “it is essential that instructors actively support students in making these connections

fully meaningful” (p. 64). They further argued that such integration has the potential to enrich the learning process.

Similarly, Ratkevičienė et al.’s Chapter 3, which presented insights from teacher educators at Kaunas Technical University, highlighted that many teachers perceive research as a task for specialists rather than an integral part of their pedagogical role: “Teachers do not associate research activities with their professional (pedagogical) work. At best, they consider them as a complementary task and assume that only scientists, researchers, or experts – not teachers – can conduct research” (p. 77).

This view positions research as an add-on rather than a core professional activity. In response, these educators emphasised the need to reframe their pedagogical role, seeing research as a collaborative and empowering process. Such reframing encourages pre-service teachers to collaboratively develop and test ideas, thereby addressing some of the most difficult challenges encountered in classrooms and schools, as demonstrated in the following quotation:

teacher educators are encouraged to understand their pedagogical role as an opportunity to empower pre-service teachers to develop, test, and refine shared understandings to pursue worthwhile educational goals. This entails orienting research activities toward addressing some of the most pressing and contextually grounded problems encountered by teachers in classrooms and schools. (p. 83)

Finally, in Jõgi et al.’s Chapter 4, the significance of integrating research with teaching practice in Tallinn University is underscored in their reaction to TREL partner observers’ feedback:

We appreciate the observers’ feedback on strengthening the link between the analyses taught in the course and their practical applications in teachers’ and school leaders’ everyday work. While this is challenging, it represents an important area for improvement in the course. (p. 91)

While observers acknowledged efforts to connect course-based statistical and analytical instruction with practical applications in schools, these connections remain underdeveloped. The partners concluded that, despite current challenges, enhancing this integration is essential for the course’s future impact.

In sum, teacher educators from these Nordic-Baltic contexts stressed the importance of bridging the gap between theory and practice while fostering a

dynamic environment that supports ongoing teacher development. We hope that the locally outlined best practices in this handbook offer valuable insights into the contextual practices through which pre-service teachers learn to do research within faculties. Furthermore, these practices aim to guide teacher educators in preparing future teachers to become research literate – equipped not only to understand research but also to conduct classroom-based research and improve their teaching.

Drawing on the chapters presented in this book, we propose the following implications:

Integrate research with professional practice

In all cases, teacher educators highlighted the importance of creating explicit links between academic research activities and everyday teaching challenges. These efforts underscore how research skills may contribute to professional development by enabling pre-service teachers to select research topics that resonate with their interests and classroom experiences, thereby enhancing a sense of ownership. At Malmö University, this approach resonated through the metaphor of adopting a “researcher’s gaze”, while at Tallinn University, it was reflected through the explicit alignment of research tasks with activities in stand-alone courses and workshops, ultimately supporting students’ thesis work. Teacher educators at both Malmö and Tallinn universities highlighted the importance of providing ongoing support within formal teacher-training programmes and classroom settings, such as guidance on preparing annotated bibliographies and designing data-collection instruments, including questionnaires and interview questions.

Similarly, in all cases, research was framed as a personal endeavour that requires deliberate methodological and textual decisions while promoting critical reflection on both process and outcomes. For example, in the OsloMet case, revising research questions based on emerging data was identified as a crucial part of an authentic learning experience. This flexibility may accommodate the trial-and-error nature of early-stage research among novice researchers, allowing them to adjust their research questions in response to emerging data.

Early introduction and scaffolded research literacy

Teacher education programmes examined in the TREL project employ a scaffolded course design that systematically guides pre-service teachers from narrowing a research topic into focused research question(s) through hands-on

data collection and analysis. These programmes capitalised on breaking the research process into clear, manageable steps and allocating sufficient time to each stage to promote student independence. In the OsloMet case, for example, teacher educators showcased implementing low-stakes assignments, such as reflective journals or mini-inquiries, to introduce research literacy gradually and build confidence before engaging in more complex tasks.

Leveraging educational technology

Classroom observations at Malmö and Tallinn Universities highlighted the use of international databases and search engines (such as Google) to support literature searches and raise awareness about locating reliable studies online. At OsloMet, online tutorials and step-by-step guides were offered through the university's website to support pre-service teachers throughout the research process. In addition, collaborative web tools such as Padlet were used to stimulate ideas and refine research topics into focused questions (see Chapter 1). In the OsloMet case, web tools were also seen as a way of building a safe space where students could freely explore and test different research topics and questions, both digitally and in smaller groups. Furthermore, educational technology can extend learning beyond the borders of the classroom when teaching research skills. To illustrate, ideally, adopting flipped classroom approaches allows pre-service teachers to engage with core content, such as readings or recorded lectures, prior to class, thereby freeing in-class time for interactive discussions, group work, and collaborative projects (see Kaunas Technical University case in Chapter 3). This structure aims at pre-service teachers focusing on more communicative and productive tasks in the classroom.

Fostering collaborative and reflective research communities for novice researchers

At Gothenburg University, students were given the opportunity to meet and work with experienced researchers during the observed research workshops. These interactions modelled diverse methodological approaches to research and encouraged professional socialisation between novice and experienced researchers, thus fostering reflective learning. Similarly, at OsloMet, peer reviews, collaborative workshops, and group projects were implemented as best practices to build a vibrant research community. Additionally, reflective practices, such as utilising visual representations of research phases to help students track progress and plan future steps at Malmö University, helped pre-service teachers to organise and construct their learning.

In sum, the best practices in teaching research showcased during classroom observations in the TREL network imply that pre-service teachers need to be introduced early to both learning about and learning to do research as part of developing research literacy. Teacher educators can scaffold this process in various ways such as:

- implementing low-stakes research assignments, such as reflective journals or mini-inquiries.
- planning regular peer reviews, collaborative workshops, and group projects to learn from one another.
- guiding students through the research process, from engaging with literature to hands-on data collection and analysis.
- building a safe and supportive environment where students can freely explore and test different research topics and questions, both digitally and in small groups.

Additionally, the best practices we observed in classrooms and discussed within our network stressed the importance of linking research to professional practice, establishing research communities for novice researchers, and harnessing the power of educational technology to enhance the research literacy of pre-service teachers.

2) Supporting In-service Teachers Conducting Research in the Classroom

Parts 2 and Part 3 of this volume, focusing on in-service teacher and school leader cases, demonstrate that, in the ever-evolving world of education, empowering in-service teachers to engage in classroom-based research is crucial for fostering continuous improvement and innovation at both individual teacher and systemic levels. The following recommendations outline essential strategies and support that enable in-service teachers to conduct meaningful research in their classrooms, enhance their teaching practice, and contribute to the broader educational community. This approach transforms schoolteachers into active researchers committed to sustainable and evidence-informed research practices.

Create time allowances for research within teachers' schedules

One of the greatest hurdles teachers face when conducting research is the lack of time. This concern is highlighted in Chapters 6, 7, and 11, where teachers emphasise the need for sufficient time to carry out research. As Kleppe Baadstø states in Chapter 7 (p. 122), “the demanding reality of teaching should not be

underestimated. Since participating in projects requires additional time, we must always consider this before committing.” To tackle this issue, schools must recognise the value of teacher-led research for professional development, the development of the educational community, and the welfare of their students. School management must allot dedicated, protected time within teachers’ schedules for planning, conducting, and reflecting on research activities. Regular, protected time slots for research reduce competing pressures and allow teachers to focus on their inquiries. This approach may integrate reflective practice and research seamlessly into the daily rhythm of teaching.

Offer school-based mentoring by university researchers

As highlighted by Christine Funtek in Chapter 12, mentorship is crucial for supporting teachers’ research endeavours. Pairing schoolteachers with experienced university research partners, who are also teacher educators, provides invaluable guidance and expertise in research design, data collection, and analysis. School-based mentoring fosters a collaborative environment, enabling teachers to experience collegial equality with university researchers, feel supported, develop confidence in their research pursuits, and develop collaborative research networks with their university partners on an equal footing through university-school partnerships.

Establish teacher-researcher communities of practice

Over time, experienced teacher-researchers should be able to independently create and sustain communities of practice that support novice colleagues. These communities will provide platforms for sharing insights, offering feedback, collaborating on research projects, and guiding less-experienced colleagues. Regular meetings and discussions within these communities will foster a culture of continuous learning and mutual support, as demonstrated by Lier Upper-Secondary School in Norway (see Chapter 13). By drawing on collective wisdom and diverse perspectives, such communities will enhance the quality and impact of classroom-based research and promote sustainable development in teacher research.

Recognise and reward research efforts

Teacher-researchers in both Lier and Drammen upper-secondary schools noted that positive student feedback and improved performance are rewarding outcomes of their research. However, recognition and rewards from school management are also powerful motivators for teachers to engage in research.

Schools should acknowledge teachers' research efforts through professional development credits, promotion pathways, and salary incentives based on measurable practice development. Such recognition validates teachers' commitment and incentivises ongoing research activities. By celebrating research achievements, school management can cultivate a culture that values evidence-informed practice and continuous improvement.

Provide easy-to-use research toolkits

To simplify the process of conducting classroom-based research, university researchers should develop, or ideally even co-develop, practical, easy-to-use research toolkits tailored to teachers' needs. As Lier school leader Nina Forsberg (Chapter 13, p. 206) explains, “[t]eachers require tools that integrate seamlessly into their daily routines. Step-by-step guides or adaptable frameworks could bridge the gap between theory and action.” These toolkits should include clear guidance on methodology, data collection instruments, and analysis techniques, regularly reviewed and updated for relevance. By demystifying the research process and offering user-friendly tools, schoolteachers will be empowered to undertake research with confidence and competence.

Encourage small-scale, practice-focused inquiries

Small-scale, manageable and practice-focused inquiries are particularly beneficial for teachers as they directly address day-to-day teaching challenges. Encouraging teachers to engage in these manageable research projects allows them to explore specific aspects of their practice and implement immediate improvements. As Drammen school leader Christine Funtek notes in Chapter 12:

Small, manageable research projects that are built into what teachers are already doing are the ones most likely to stick. [...] The challenge, and the opportunity, is to design frameworks that feel like natural extensions of teaching rather than academic exercises. For this to work, information shared [...] should not only explain theoretical principles but translate them into something a teacher can try on a Tuesday afternoon. (p. 196).

Small-scale inquiries are often familiar to practising teachers, as their teacher education often involves similar projects. These inquiries can lead to more immediately actionable insights that enhance teaching practice, improve student outcomes, and provide evidence of value for school management.

To successfully implement in-service teacher research literacy, it is essential to focus on its practical application in everyday teaching scenarios: “In short, practicality is key. If teachers can “tweak” and see immediate relevance to their daily work, these models have a real chance of sticking” (Lier school leader Nina Forsberg, chapter 13, p. 205). By focusing on practical, contextually relevant questions, teachers can make meaningful contributions to their classrooms and the broader educational community.

Supporting in-service teachers in conducting classroom research is a multifaceted endeavour that requires thoughtful strategies and robust support systems. By implementing the above-mentioned recommendations, schools can empower teachers to become active researchers. This empowerment may not only enrich teachers’ professional development but also drive innovation and improvement in education. As Vanja Renee Larsen and Mats Berg-Berthinussen (Chapter 11, p. 188) note, “As soon as we started to investigate the needs of our students, we became motivated and engaged on a whole new level than what we had been before.” When teachers engage in research and reflective practice, they contribute valuable knowledge and insights that can transform teaching and learning, ultimately benefiting students and the educational community at large. Through sustained support and recognition, we can cultivate classroom-based research that is an integral and celebrated aspect of the teaching profession.

3) Sustaining TREL’s Momentum

Ultimately, TREL illustrates the transformative potential of integrating research into the professional fabric of teaching across the Nordic-Baltic region. The project highlights several cases when research became an integral part of teacher practice, and where classrooms evolved into dynamic spaces of inquiry and innovation. This handbook demonstrates how collaboration among educators, institutional commitment, and innovative dissemination may collectively strengthen research literacy and professional development.

However, sustaining this momentum requires more than isolated initiatives; it demands systemic and cultural shifts that embed research as a valued and supported dimension of teaching. To achieve this, we argue that three strategies, described below, are essential. They focus on institutionalising teacher research literacy within teacher education and professional development through fostering collaborative networks and communities of practice, and innovating dissemination and recognition mechanisms to reinforce the value of teacher-led inquiry.

1. Strengthening university-school partnerships through collaborative research frameworks

The mentorship-driven collaborations, as those showcased in Part 2 of this handbook, highlight the mutual benefits of university-school partnerships. Such alliances may empower teachers to conduct classroom-based research with methodological guidance from academics, as exemplified by Lana Chernik's self-assessment study (Chapter 6) and May Britt Kleppe Baadstø's academic writing interventions (Chapter 7). Conversely, teacher educators gain critical insights into real-world pedagogical challenges and may subsequently refine their curricula and teacher education practices. Kaunas University of Technology (Chapter 3) has institutionalised this synergy by embedding school-based action research into its programmes, thus ensuring strong theory-practice alignment. To sustain partnerships, however, formal structures (for example, shared funding models, co-supervised projects, and cross-institutional training) are essential, as demonstrated by the TREL project. These frameworks democratise knowledge creation, foster a culture of reciprocity, and transform research from a perceived barrier into a bridge between academia and schools.

2. Institutionalising research literacy through strategic leadership and policy alignment

Embedding research into institutional culture requires systemic integration. National mandates, such as those outlined in Surkalovic et al.'s Chapter 1, and the emphasis on "scientific grounding" in Nolan et al.'s Chapter 2, exemplify how policy alignment and institutional stakeholders can normalise research as a core teacher competency. Here, strategic leadership must play a pivotal role. School leader Christine Funtek at Drammen Upper-Secondary School (Chapter 12) aligned teacher research with institutional goals, for instance, linking classroom inquiries to school-wide professional development plans.

Based on insights gleaned from TREL, to ensure the sustainable development of teacher research literacy, leadership should prioritise embedding research into school improvement agendas and support this shift with structural incentives, such as research sabbaticals, administrator training, and dedicated funding for teacher-led projects. Such measures help transform research literacy from an individual pursuit into a collective responsibility. Teacher research gains visibility and legitimacy when showcased in professional forums. Through TREL's cross-border workshops, teacher-partner Nikoline Holmøy Ellefsrød (Chapter 8), for example, presented her findings on student motivation, fostering

peer learning, and interdisciplinary dialogue. Scaling such opportunities would benefit from the creation of dedicated regional networks capable of establishing annual symposia, whether virtual or in-person, where teachers can share findings, critique methodologies, and collaborate on transnational studies. Ministries of education could further amplify participation by integrating workshop and conference presentations into professional certification systems or by offering grants to support collaborative research. Such initiatives would not only recognise and validate teachers' expertise but also cultivate a shared professional identity among educators as active knowledge creators.

3. Building a digital ecosystem for resource sharing and collaboration

While digital tools remain underutilised in several contexts explored in this handbook, their potential to democratise research is significant. For instance, the use of QCAMap and Jamovi (Jōgi et al., Chapter 4) demonstrates how technology can simplify complex data analysis, while the annotated bibliography table tool described by Nolan et al. in Chapter 2 provides a simple model for structuring research inquiries. Building on TREL's collaborative ethos, a future initiative could involve establishing a regional online platform for teacher research literacy that is co-designed with input from universities and schools. This platform should centralise resources such as research templates, case studies, and peer-reviewed assessment tools. To maximise accessibility, it should prioritise multilingual interfaces, tutorials, and moderated forums for iterative feedback. This dedicated specific platform may help advance teacher research literacy by bridging theory and practice with a set of simple, reusable and scalable research and reflection tools. It could enable real-time collaboration akin to TREL's cross-border mentoring while maintaining academic rigor through transparent peer-review mechanisms.

Toward a Research-Infused Educational Landscape

TREL shows that teacher research literacy is not a fixed endpoint, but a continuous journey shaped by collaboration, infrastructure, and change. By nurturing university-school partnerships, institutionalising research through leadership, amplifying teacher voices in professional communities, and utilising digital innovation, we can support teachers' reflective practice development. As illustrated by the handbook's cases and the TREL project experiences, this

transformation requires patience: novice researchers may need scaffolding, policies must evolve over time, and trust between all parties involved takes time to build. However, the rewards can be transformative: classrooms can become laboratories of innovation, teachers may emerge as agents of systemic change, and education systems may become better equipped to meet the complexities of the 21st century. Moving forward, research literacy project-based initiatives should become a defining feature of educational excellence.