

Action Research as a Way of Working, Researching, and Reporting as a Mathematics Teacher Educator

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This methodological article uses illustrations from my own action research projects to guide a discussion of action research as a tool for connecting research and practice as a mathematics teacher educator. I begin with a brief historical summary of the development of action research as a methodology, before presenting two of my action research projects and connecting these to the broader aims and characteristics of action research. I then discuss issues I have encountered in the process of publishing on action research, together with reflections on how the issues might be addressed. Through these discussions, I aim to encourage more mathematics teacher educators to use action research as a way of systematically examining and reporting on their practice and to contribute to the broader discussions of how mathematics teacher educators can make the processes of developing their practice visible through research.

Keywords • mathematics teacher education research • action research • methodology •

Introduction

This special issue of *Mathematics Teacher Education and Development* called for articles addressing several topics relevant for studying and theorising the work and experience of mathematics teacher educators, and this article aims to answer the call for: *How are methodologies used, adapted, or developed for the study of mathematics teacher educator work?* This article therefore serves as an illustration of practice as of how I, as a mathematics teacher educator, use action research as a methodology in my work at the university, and how I adapt the methodology in various ways to improve my teaching and the learning of pre-service teachers. I use two action research projects as examples, but the main focus of this article is not on these projects but how I integrate action research as a methodology in my work and the ways I overcome obstacles in theorising action research in practice, collecting data and publishing the research.

Universities in Europe have, for several years, focused on research-based teaching, and student-centred course design (Stensaker, 2019). However, this can be challenging because, although teaching and researching are recognised as core functions of universities worldwide, they are not always integrated (Patfield et al., 2023). Mathematics education has an advantage due to how the research field informs directly teaching practices. I, therefore, argue that mathematics teacher educators need to be exemplary in how they teach, and report on how this perspective was informed by research. Even though there are many published studies of intervention in teacher education, these tend to focus on producing knowledge to inform the field rather than developing teacher educators' self-understanding to inform their practice (Chapman et al., 2020).

Goodman and colleagues' (2025) findings overwhelmingly suggested that Kazakhstani teacher educators are motivated to engage in action research projects, but they identified some challenges as well. Allocated time for the project was viewed as a challenge, but they also pointed out the need for more guidance and clarity in various stages of action research. This resonates with how Barkhuizen (2021) described research tensions and identity dilemmas when comparing academic institutional



research with teacher research (Barkhuizen, 2021, p. 372). Although action research is often experienced as meaningful, it can be challenging for a teacher educator to find ways to conduct such research within the academic systems in which they work.

Therefore, the aim of this article is to investigate the research question:

What have I learned about conducting and reporting action research through my experiences as a mathematics teacher educator?

To answer this research question, I have organised the article in three phases. In the first phase, I investigate and engage in the literature on action research and use the review to inform how to design and conduct action research in a way that is meaningful for me. In the second phase, I use definitions from the literature to explain and argue how I have conducted action research, using two cases from my practice as examples. In the third phase of the article, I discuss challenges I have encountered in the publication of outcomes process and how the challenges were resolved. This article therefore serves as an illustration of practice on how to use action as a methodology as a mathematics teacher educator and is as such meant to inform colleagues on how they can use action research in their work.

Phase 1: A Brief History of Action Research as a Methodology and its Developing Characteristics

Action research is one of several methodologies that can be labelled as practitioner research that arose from tensions within the movement for the scientific study of education in the late 20th century and early parts of the 21st century (Zeichner & Noffke, 2001). While action research in the beginning was ridiculed and judged by conventional academic standards (Zeichner & Noffke, 2001), it is today a well-established methodology (McNiff, 2016; Wellington, 2015). The book, *Becoming Critical: Education, Knowledge, and Action Research* (Carr & Kemmis, 1986), is considered a classic within the field. The authors define action research as: A form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which these practices are carried out (Carr & Kemmis, 1986, p. 162). While a teacher studying, researching and intervening their own practice is associated with practitioner research, it is worth noting that the key aim of action research is to bring about critical awareness, improvement and change in a practice setting or system. It therefore involves reflection, planning and actions as key elements (Wellington, 2015, p. 32).

The cyclic nature of action research has been long emphasised. Carr and Kemmis (1986) go so far as to argue that in action research, a single loop of planning, acting, observing and reflecting is only a beginning; if the process stops there it should not be regarded as action research at all (p. 185). Earlier, Corey (1953) described in detail five steps in the action research cycle, which comprised of: identifying the problem area; selecting a specific problem and hypothesising; carefully recording actions taken and evidence of effect; inferring generalizations about the relation between actions and the desired goal; and continuously retesting these findings in action situations (pp. 40–41).

Action research as a field has continued to develop over the decades and an understanding of what can be considered action research has broadened. Various approaches and methodological examples in major handbooks including, *The SAGE Handbook of Action Research* (Bradbury, 2015) and *The SAGE Handbook of Educational Action Research* (Noffke & Somekh, 2009). As the research field has evolved, so too has understanding of the characteristics considered central to action research. Kemmis and colleagues (2014) revisited their understanding of what constitutes action research, stating:

Interrogating our practices through critical participatory action research doesn't always follow a neat progression of steps. It certainly doesn't follow the usual steps of research design familiar in conventional scientific research that appears to start with articulating a research question, forming an hypothesis, arranging experimental or observational conditions that allow us to test the hypothesis, collecting 'data', analysing results, and arriving at an interpretation that links the new findings into a research literature. Nor does it always follow the steps of planning, acting, observing, reflecting, then

re-planning, acting again, observing again, reflecting again, and so on that Kurt Lewin (1951) described as central to action research. (Kemmis et al., 2014, p. 6)

Thus, an understanding has emerged that the cyclical process associated with action research is not, in itself, the defining feature of the methodology. Similarly, action research can involve collaboration between researchers and practitioners to initiate change; the practitioner does not have to undertake the research independently (Noffke & Somekh, 2009).

This broadening of perspectives on conducting action research raises the question of what defines and distinguishes action research from other methodologies. The defining feature that cannot be disregarded when conducting action research is the intention of bringing about change through the research process (Kemmis et al., 2014; Wellington, 2015). McNiff (2016) identified four features commonly associated with action research: a commitment to reflection, knowledge generation, participative and collaborative working and practice transformation (p. 20). The question is how to achieve these broad goals, and according to McNiff (2016, p. 20), action research should include the following aims:

- a commitment to educational improvement;
- special kinds of research questions;
- taking responsibility for the self; and
- educational action that is informed, committed and intentional.

In 2025 I published two articles reporting on action research I conducted as a teacher educator, based on my teaching of pre-service and in-service teachers in mathematics education at my university. These projects serve as illustrations of practice in the following discussion of action research as a methodology for mathematics teacher educators (MTEs). I use the four aims as described by McNiff (2016) as a framework for presenting how I interpreted and enacted my action research projects. I then discuss some of the challenges I encountered, particularly in the process of publishing this work. This discussion draws on feedback from reviewers, my experiences as a reviewer, and an examination of articles on action research published in the journal, *Mathematics Teacher Education and Development*.

Phase 2: Action Research Projects Conducted by a Mathematics Teacher Educator

An important feature of my teaching and research context is the degree of autonomy I have as an MTE at my university. Provided I meet the general requirements of a course—for example, addressing content relevant to the levels the students are preparing to teach and knowledge required by the national curriculum—I have considerable freedom to select curricular materials, design assessment tasks, and determine the form of final examination, within the requirements of examination legalisation. For example, I can choose to use an oral examination if I think it is the best way to evaluate the pre-service teachers' learning. I recognise that not all teacher educators have the same degree of autonomy in course design. Nevertheless, opportunities to modify teaching and assessment practices exist within most institutional contexts, and my experiences may provide insights into the possibilities for action research in mathematics teacher education.

The first action research project was reported on at the Congress of the European Society for Research in Mathematics Education conference (CERME 14) (Opheim, 2025). In this project I conducted action research to develop a Master's-level course for teacher specialists, with the aim of empowering them as change agents in their schools, thereby bridging theory and practice. Change agents can support both top-down and bottom-up changes, and the latter is the focus of this project. The course combined learning theories in mathematics education with theories of professional development and research. In reporting on the project, I identified and discussed factors that enabled or inhibited teacher-led change efforts. Through a collaborative process involving myself as the MTE and the in-service teachers, we identified ways of addressing these factors and achieving changes in practice. Most

notably, we found ways to secure support from the principals or school leaders, to ensure bottom-up changes occurred within the schools.

The second action research project had a very different aim and has been published in a Q1 journal (Opheim & Xenofontos, 2025). The project involved reflecting on the revisions made to a mathematics course for multicultural and multilingual pre-service teachers in Norway. The course had originally been designed and taught by me, and together with a colleague, Xenofontos, I analysed how it was restructured and retaught in response to the pre-service teachers' experiences, high failure rates, and our shared professional values. Using an action research approach and drawing on the equity-diversity-inclusion framework by Abtahi and Planas (2024), we examined changes to pedagogy, assessment, and student support. The project contributes to discussions about how mathematics teacher education can be more inclusive, responsive, and just. The course was an introductory course for pre-service teachers preparing to teach Grades 1–10, with content that integrated mathematics and mathematics education. In Norway, this integration is common in teacher education, requiring pre-service teachers both to demonstrate mathematical proficiency, including computational skills and to develop knowledge and competence needed to teach the mathematics topics.

While both research projects were conducted within an action research framework, they had quite different aims. The difference was reflected in how they were reported and provides a foundation for discussing the publication of action research undertaken as an MTE researching their practice. In the following sections, I use the two research projects to illustrate how action research can be undertaken and reported, while highlighting some of the challenges encountered in the process. The presentation of the two projects is structured according to McNiff's (2016) four aims of action research. Each section begins by explaining how I understand the particular aim identified by McNiff (2016), followed by examples from my work and reflection on related issues.

A Commitment to Educational Improvement

Action research is about improving learning in order to influence improvement in a particular social context (McNiff, 2016, p. 20). I noted earlier that the main characteristic of action research is intention to bring about change. This implies not only identifying something that might be improved but also engaging with broader questions about educational improvement, including what improvement means, the nature of the processes involved, the purpose of education, and who or what should be changed (McNiff, 2016). For example, here at my university, as at many other universities, there is an ongoing debate about whether the algebraic and computational skills of students have declined. So, who needs to change? Should students be better prepared for university study? Should university courses be adjusted, or should expectations be modified to accommodate students' preparedness? Are there other possibilities? Would changing how mathematics is taught at university make a difference? None of these questions are answered easily but raising the questions and discussing them openly and critically demonstrates a commitment to educational improvement.

In the first action research project, my commitment for instructional improvement was related to designing a course in the Teacher Specialist program in Norway for teachers teaching Grades 5–10 (Opheim, 2025). The Teacher Specialist program was a government initiative intended to support dedicated teachers in leading professional development with colleagues in their schools. However, Norway has a relatively flat organisational structure in which employees, including teachers, often have considerable professional autonomy. Although the curriculum specifies what students should learn in mathematics, teachers have the discretion to choose how this learning is achieved. This context presented particular challenges for Teacher Specialists. The professional development program was initially met with some resistance, partly because of the name Teacher Specialist (Hoem et al., 2017). In a context where claims of being better than others may be viewed with scepticism, teachers appointed to these roles could find it challenging to establish themselves as leaders of mathematics teaching within their schools.

An evaluation of the Teacher Specialist pilot identified a need to strengthen schools' involvement in the in-service teachers' assignments in the course. The in-service teachers also expressed a need for tools to initiate change processes at their workplaces, together with greater awareness of and preparation for guiding colleagues (Seland et al., 2017). Considering similar challenges, Hoem et al. (2017) argued for approaches that would enable teacher specialists to act as change agents within their workplaces. This provided the background for designing a course intended to support in-service teachers in becoming successful change agents within their schools. Change agents were defined as individuals who can successfully transform aspects of how organisations operate (Brown et al., 2023, p. 1).

In the second action research project, my commitment for instructional improvement was related to improving a mathematics teacher education course for multicultural and multilingual pre-service teachers (Opheim & Xenofontos, 2025). The University of Agder offers an alternative teacher qualification program specifically designed for first-generation immigrants. This three-year bachelor's degree program enables students to qualify as subject teachers. Admission requirements include a general university and college admissions certification, and the applicant's first language must be neither English nor a Scandinavian language.

We had previously given the course using a digital learning environment, originally created for Norwegian in-service teachers pursuing professional development in mathematics. The environment provided flexible, self-paced learning and included instructional videos, suggested readings, discussion forums, assignments, and other resources. It had already been proven to be effective for several hundred Norwegian teachers. The multilingual pre-service teachers were granted access to the same digital environment, with the addition of four in-person gatherings each semester to provide extra support to manage the transition to this mode of study. Although the design was well-intentioned, its implementation did not lead to realisation of the expected outcomes. The structure and expectations, which were modelled on formats familiar to Norwegian in-service teachers, proved less accessible for some in this cohort. Consequently, some students became increasingly reliant on additional support and had limited opportunity to develop independent study routines. At the final oral examination, 13 of the 43 pre-service teachers did not pass, and none of those who failed attempted a second examination. These outcomes prompted us to reconsider the course design and, more broadly, how the structure, pedagogy, assessment, and support provided could better respond to the needs of this cohort.

At first glance, the outcomes of the mathematics course could be read as a matter of individual effort, an interpretation that might offer a convenient explanation for me as a university lecturer. Such a perspective, however, risks overlooking deeper systemic issues. What if these results were not simply due to individual effort, but rather the consequence of unintended practices of marginalisation? Could the improvement of outcomes be achieved by designing a course that more intentionally considered the experiences and needs of this unique group of pre-service teachers? These questions led us to reconsider our approach and investigate how the course could be redesigned to promote equity, diversity and inclusion. We adopted these theoretical descriptions proposed by Abtahi and Planas (2024), who conceptualised efforts to counter marginalisation in mathematics education as work towards these three principles.

Both action research projects were founded on a commitment to educational improvement, but the nature of that commitment differed. The second project was grounded in addressing the high failure rate in a pre-service teacher education course for multilingual pre-service teachers, whereas the first project aimed to empower in-service teachers to act as change agents when they returned to their schools. Thus, the reasons educational improvement differed qualitatively across the two projects. Improving course completion rates is a well-established goal of most universities, but rather than attributing high failure rate to the pre-service teachers themselves, we considered whether the problem might lie in how the course was structured and delivered. This recognition became the starting point of our research: we identified the course as a site for improvement and investigated ways of redesigning it to better support the students. In contrast, the Teacher Specialist project was not primarily a response

to an identified deficit in the course but sought to add opportunities that would better prepare in-service teachers to contribute to professional learning and change in their schools. Despite these differences, both projects were grounded in the belief that, as MTEs, we could make changes through our own courses and practices to foster educational improvement.

Special Kinds of Research Questions

The research questions guiding action research should, according to McNiff (2016), signal the researchers intention to intervene in and improve their practice, while accepting responsibility for doing so. Consequently, action research questions often begin with the word *how* and explicitly position the researcher(s) within the questions. Both of my action research projects adopted research questions consistent with this perspective. Within the Teacher Specialist project, the research question was: *How can I design a professional development course for Teacher Specialists in mathematics that will make them successful change agents at their workplace?* (Opheim, 2025). In the project involving multilingual pre-service teachers, the guiding research question was: *How can we design a pre-service mathematics teacher course for multicultural and multilingual students that works towards equity, diversity, and inclusion?* (Opheim & Xenofontos, 2025).

As I understand it, the research question should signal an intention to make educational improvement while positioning the researcher as an active participant in both making and analysing the resulting changes. Although the methodological approaches used to conduct action research may vary, as discussed in the introduction, the research question conveys the purpose and intent of the research. I therefore argue that the research question should make it possible to recognise the study as action research, particularly through its explicit intention to contribute to educational improvement.

Taking Responsibility for the Self

Action research projects may vary to some extent when it comes to the roles of researchers and practitioners, but if action research is conducted in teacher education, then I am both part of the research and the author of the research. This implies the need to make the researcher visible, both in the research process and in its documentation. As Flornes (2007, p. 91) noted, [i]t requires action as an integral part of the research process itself, being focused by the researcher's professional values rather than methodological considerations, and it is necessarily insider research.

In both action research projects, I made an effort to make myself and my intentions visible for the reader in the reports. Both explanatory accounts, in which I articulate the reasoning and intentions behind my actions. To make this reflective stance explicit, I write in the first person. There was, however, a difference between the two projects. While the changes made in the teacher specialists can be theoretical justified by the political and theoretical focus on them as change agents, the research project with the multilingual pre-service teachers is more explicitly value driven and needed a very detailed account of the researchers' place in the project.

I wrote the report about the pre-service teachers together with a colleague and we viewed it as important to clarify the distinct roles of the two authors in the project. I, as the first author was involved throughout the entire process, leading course revisions, implementing changes, and teaching the course. Xenofontos' (the second author) involvement was limited to analysing and co-authoring the article. This collaboration enabled a productive dialogue between an insider researcher and a colleague offering an outsider perspective. In addition, to enhance the trustworthiness and transparency of the study, we included positionality statements outlining our respective backgrounds, roles, and perspectives (Milner, 2007; Olukotun et al., 2021). Providing these statements allows readers to better understand the lenses through which we approached the redesign, implementation, and analysis of the mathematics teacher education course. This is because speaking about "I" does not mean all about me. It comes from an ontological perspective that studying the self, therefore is about studying the "I", who



is always in a dialogical relationship with other “I”s who are also open to dialogue (McNiff, 2016, p. 25).

Working on these action research projects has also developed my thinking and learning about making changes and improving educational practice. McNiff (2016) pointed out that action research involves interrogating, deconstructing, and decentering. By this, she means that, to develop the capacity for dialogue, researchers need to interrogate their values and logics, deconstruct their ways of thinking, and actively challenge the idea of what is positioned as the centre. This has been a learning process for me. I became more visible as a researcher in the second article, which focused on multilingual pre-service teachers. While this increased visibility can, to some extent, be explained by the more explicitly value-driven nature of that research, it also reflects my development as an action research researcher and my growing awareness of, and willingness to make explicit, my position within the research project.

Educational Action that is Informed, Committed and Intentional

The final aim required to achieve the broader goals of action research, according to McNiff (2016), is recognised by many as a distinct feature of action research, because it involves action. McNiff emphasised, however, that it is not any type of action. The action of action research is informed, committed and intentional, with a view to generating knowledge of practice for personal and social wellbeing; these elements turn “practice into praxis” (“praxis” implies taking morally committed action) (McNiff, 2016, p. 26).

By *informed*, McNiff (2016) specified that it means an informed, purposeful action which begins with a felt need to do something: this transforms into intent and then again into action. It also involves an understanding that other people might be more informed than myself, and a need to question my own understanding and perspectives. This process is about finding a balance between conviction and open-mindedness. *Committed* action is the second emphasis by McNiff (2016). Meaning that when you have decided to act, you do so. This commitment is closely related to the researchers' values and should drive the action. While of course continuously evaluating what is being done, and even questioning the rightness of your values, you need to hold on to what you believe is worth believing even though others might challenge you or disagree. Thirdly, action research is *intentional*. “Initiating a project implies that you intend to do something about something” (McNiff, 2016, p. 27). The notion of intent is closely related to action because once something is intentional in the mind, it triggers the actor's capacity to take action.

Initially, when reading up on action research, I understood *informed*, *committed* and *intentional action* somewhat differently from how I understand them now. I understood being *informed* as having theoretical knowledge about an issue and drawing on that knowledge when deciding how to act. This may still be the case in many research projects; however, I have also come to recognise although I bring informed theoretical knowledge to the context in which I conduct action research, it was ultimately my values that guided the choices I made about how to act. Let me explain through an example from the teacher specialist course.

The intention of the changes made to the Teacher Specialist course, was to make the teachers successful change agents in their workplace. The students learned about models for professional development, including *lesson study* where the goal is to systematise teachers' learning (Munthe et al., 2015). I recognised, however, that learning about professional development approaches and rehearsing it with fellow students, is not the same as actually leading such a process at one's school. I therefore wanted to challenge the in-service teachers in the Teacher Specialist course to move beyond learning about lesson study by requiring them to lead cycles of lesson study in their workplace.

Although teacher education courses may introduce lesson study as a professional development approach and provide opportunities for their students to test it out (Munthe et al., 2015), I designed this course to challenge in-service teachers to both learn about lesson study and lead their colleagues in its implementation, without them necessarily having the experience of participating in lesson study

previously. I chose lesson study because it is grounded in a bottom-up approach to change, in which teachers work collaboratively to identify through a GAP-analysis their professional learning needs areas for improvement in their teaching. Given the relatively flat hierarchical structure in Norwegian schools, I considered this approach appropriate for supporting the in-service teachers to lead professional development where their colleagues could develop a shared sense of the process.

In addition, I gave the in-service teachers considerable freedom to adapt the methodology of lesson study to suit contextual challenges at their schools. Although some elements of lesson study are considered important to retain if the approach is to be implemented successfully, I considered it more important that the in-service teachers actively lead lesson study at their school, rather than merely follow prescribed steps. At the same time, I required them to reflect upon what they gained and lost through the adaptations they made. This resulted in in-service teachers developing a more reflective perspective on lesson study. Several of the in-service teachers subsequently identified changes they would reconsider and aspects of the process they considered important to retain in future implementation.

Looking back upon my choices as an MTE, I now recognise they were value-driven, in the way that the most important goal was to empower the in-service teachers as change agents in their schools. Lesson study and theories of leading professional development were, therefore, means through which I sought to support change in schools. This also explains why I was willing to allow the in-service teachers to deviate from methodological requirements of lesson study. In doing so, I was expressing my professional trust in and respect for them as mathematics teachers. Although none of the in-service teachers in the Teacher Specialist course followed all the requirements of lesson study as a method, several started a change process at their schools that continued after the course had ended (Opheim, 2025).

This example demonstrates that, although I previously claimed that the two action research projects differed qualitatively in their reasons for improvement, I now recognise that there may have been more similarities than I first thought. The explicit external motive differed: one project focused on improving completion rates, while the other sought to bridge theory and practice and empower teachers. Nevertheless, both projects were closely connected to my values as an MTE. It was these values that both initiated and ultimately drove both action research projects.

Phase 3: Publishing Action Research

Conducting action research is only the beginning of the process; the research is not complete until the learning generated is made public. This aligns with Stenhouse's (2011) well-known definition of research as [s]ystematic inquiry made public. For me, making the findings of action research public is not only an important part of the research process but also a contribution to the teacher educator community. I believe that MTEs could do more to share innovations and developments in MTE teaching practices.

To explore, in part, the extent to which action research is represented in the mathematics teacher education literature, I searched the archive of *Mathematics Teacher Education and Development* (MTED) for the phrase action research across all articles published. This was a limited exploratory search rather than a systematic review, as it focused on a single journal and a single search term. This search returned 11 results in total. On examining these articles more closely, I found that only five identified action research or practitioner research as the methodology used in the study (Atweh & Heirdsfield, 2003; Bragg, 2017; Quebec Fuentes, 2013; Restani, 2021; Webel et al., 2021). One of the 11 articles presented a form of meta-analysis of teachers engaging in action research (Coles & Brown, 2021), while the remaining articles mentioned action research without using it as a methodology to answer the research questions.

Other practitioner-oriented methodologies such as self-study, are also represented in MTED, although they do not appear to be published extensively in the journal. This raises questions about why

research arising from MTEs professional learning and development appears relatively infrequently in the journal. Given MTED's focus on mathematics teacher education, it might seem a natural venue for MTEs to share action research undertaken in their teaching contexts. A possible explanation is that MTEs may not make that many changes to their teaching. However, my experience of the international community of mathematics teacher educators suggests otherwise. MTEs continually develop courses, experiment with new approaches, and introduce innovative solutions to address the needs of mathematics teacher students. So, why are so few studies reported through publication as action research?

It is worth noting the relatively recent emergence of MTE research as a distinct research domain. It was not until the late 1990s that research focused specifically on mathematics teacher educators and their work began to be recognised as an area requiring attention. Zehetmeier et al. (2026) described how, around this time, the European mathematics education research community acknowledged a distinction between research conducted by teachers and research focused on MTEs themselves, with MTE research subsequently developing as a domain in its own right. Since MTE research has emerged relatively recently as a recognised field, it may take time for traditions of researching and publishing MTEs' own professional practice to become established. From this perspective, the limited representation of action research in MTED may reflect not only what MTEs choose to research and publish, but also the relatively recent development of a research culture focused explicitly on MTEs' own practice.

The question, then, is not necessarily related to whether innovation in MTE practices is occurring, but why so little of it appears to be reported through action research. My own experiences of undertaking and publishing action research have led me to reflect on this question. In the following section, I draw on those experiences to consider some of the challenges and possibilities associated with publishing action research as an MTE.

The Main Aim is to Create Change

While there are various ways of conducting and presenting action research, there is broad agreement that a key characteristic is to create intentional and informed change. This led me to reflect on how an article where the main aim is to *create* change would differ from an article where the main aim is to *evaluate* change. To me, it became evident that if an article is to capture the nature of action research in an article, it is not sufficient to present only the results or outcomes of the change process. It also needs to make visible the intentions underlying the changes, the reasons for decisions made, the adjustments that occurred along the way, the negotiations with various stakeholders, and how issues encountered were resolved. These processes are central to understanding action research, in some cases, they may become more important than the outcomes initially identified as the purpose of the action research.

This was the case in the action research project involving the multilingual pre-service teachers. Although the initial aim was to improve completion rates in the course, the focus shifted towards making changes informed by equity-diversity-inclusion framework of Abtahi and Planas (2024). Through this process, the community, shared experiences, and social cohesion that grew out of these changes became more important than the original focus on completion rates. Indeed, in the first submission of the article, we did not report that completion had increased to 100%. A reviewer subsequently asked about the completion rate, prompting us to recognise that this outcome also needed to be included. This experience reinforced for me that, in action research, the significance of the research cannot necessarily be determined by the extent to which the original outcome is achieved. Rather, it lies in making visible the evolving intentions, decisions, relationships, and learning through which change occurs.

However, reporting on the process of change is challenging and requires a different way of presenting results and analysis, which may not always be understood by readers or reviewers. When writing the action research report for the Teacher Specialist course, I initially received comments from reviewers asking me to remove parts of my results because the section included details on how the

course was designed and, in their view, did not belong in a results section. They expected a results section that followed a more conventional structure.

A similar issue arose in the article on the mathematics course for multilingual pre-service teachers, where reviewers questioned why we introduced new theoretical perspectives in the results section. Their expectation was that the results section should report the study findings rather than introduce additional theoretical literature. In retrospect, it may have been more strategic to use a different heading for this part of the action research article. The term results, appears to carry established expectations about what should be included in the section, which may make it difficult to represent the iterative and evolving nature of action research within a conventional article structure.

Instead, we used the introduction to the results section to make explicit how action research had been used as a methodology throughout the results section and to explain why new theoretical perspectives were introduced. This experience made me more aware that publishing action research involves not only conducting research differently but also finding ways to communicate that research within established conventions for presenting results and analysis. We addressed the issue in the journal article by stating:

In line with the action research approach, we present our results as cycles of observation, reflection, action, and outcome. For each major change, we describe what we observed in practice, how we interpreted this evidence, what modifications we made to the course, and what outcomes we noted. This structure makes explicit how action research guided the ongoing redesign of the mathematics course. We begin with the dimension of *practice* and followed by the dimension of *awareness*. In doing so, we incorporate relevant new literature where appropriate, situating these changes within broader international discussions. (Opheim & Xenofontos, 2025, pp. 10–11)

Another aspect of reporting on change is what to include and what to leave out. Journal articles are subject to word or page limits, and conference papers are often similarly constrained. These restrictions can make it difficult to represent the complexity of an action research project, particularly when the process of change, rather than simply its outcomes, is central to the research report.

I experienced this tension when writing about the Teacher Specialist course for a Congress of European Research in Mathematics Education conference, CERME14. The 8-page limit meant I could not provide extensive detail about the change process. I was nevertheless able to produce a coherent account because the project had a very specific and focused aim for change. In contrast, the action research on the mathematics course for the multilingual pre-service teachers initially required 17 pages. Following review by five reviewers, who requested additional information about various aspects of the research, the article grew to 23 pages. Although the review process strengthened the article, particularly through the expansion of the methodology section, this experience also highlighted the challenge of accommodating the detail that reviewers may expect when reporting action research. In this case, the journal had no upper page limit, which made it possible to respond thoroughly to the reviewers' requests.

Although it is not unusual in academic writing to accommodate reviewers' requests for more details, it is my impression that action research faces additional challenges. As I discussed earlier, understanding of action research methodological techniques has developed over time, and now there is a broader recognition of various ways to conduct and report action research. These developments are not necessarily reflected in reviewers' expectations, however. In the article on the mathematics course for multilingual pre-service teachers, for example, the action research cycle was not central to the way we presented and conceptualised the research. We initially omitted it and instead argued and explained our methodological choices in relation to McNiff's (2016) four aims for achieving the broader goals of action research. During the review process, however, reviewers expected and requested that we include an action research cycle. We could have argued against this request but ultimately decided including the action research cycle was more productive rather than making it a point of contention.

This experience led me to recognise that publishing action research involves negotiating not only the constraints of publication formats but also reviewers' expectations about what an action research

account should look like. For me, this raises an important question about how much methodological detail is necessary to establish an action research study as legitimate, and how much of that detail reflects the expectations of the reviewer rather than the needs of the research itself.

Trustworthiness

One measure for achieving trustworthiness in qualitative research is to provide thick descriptions of what data were collected, how they were collected, and how they were analysed (Lincoln & Guba, 1985). This is challenging to achieve in action research, because the data used in the research are likely to include course materials, reflect the researcher's values, accommodate previous knowledge and experiences, examples of students' reactions and feedback, and details about course outcomes, among other things. Likewise, these data are not necessarily systematically analysed in ways that might be expected in other types of research. The challenge, then, is to convey to the reader that this is still done in a scientific manner, although the analysis and outcomes are presented differently.

Including the researcher in this process with her values and decision-making, is an important part of this but may be viewed by some as less scientific and objective. Action research does not aim for objectivity in the conventional sense; rather, it provides a detailed account of a change process, recognising that change is shaped by social negotiation and values. I reviewed an article in which the researcher sought to address issues of trustworthiness by including reflection notes made throughout the design and implementation of a course as part of the data collected and then analysing these reflection notes using categories from an analytical framework. Even though this process makes the analysing process transparent, I also think something important can be lost. To me, having access to the researchers' reflections and thoughts both in the process of making changes and in hindsight is one of the most valuable aspects of action research. Reducing these reflections to text that is analysed objectively using theoretical categories may eliminate one of the main features of the methodology as I understand it.

While there might be occasions where such an approach could be fruitful, I hope it is for reasons other than simply aiming to make the research considered more trustworthy. I think we need to challenge ourselves in reporting action research in ways that embrace the heart of the methodology while still presenting the research in a scientific manner. For me, it has been helpful to use a theoretical perspective or framework to guide the selection of data presented and analysed, thereby providing a scientific lens through which the changes made can be examined and evaluated.

Another aspect of trustworthiness in action research is that the researcher herself is an important part of the research. This means that an action research article may need to use different criteria to establish trustworthiness. In the article from the mathematics course for multilingual pre-service teachers, we used positionality statements for this purpose:

To enhance the trustworthiness and transparency of our study, we include positionality statements outlining our respective backgrounds, roles, and perspectives (Milner, 2007; Olukotun et al., 2021). In qualitative and action research, the researcher is not a neutral observer but an active participant whose identity and experiences shape both the process and the interpretation of the work. Providing these statements allows readers to better understand the lenses through which we approached the redesign, implementation, and analysis of the mathematics teacher education course. (Opheim & Xenofontos, 2025, p. 7)

While this is a way of addressing issues of trustworthiness and transparency in action research, it raises another issue when publishing via a double-blind peer review process. I assume that the purpose of blind peer review is to reduce the influence of the researchers' names and status on the review process, allowing reviewers to consider the article independently of the authors' identities. However, my action research projects cannot be understood without including me as a researcher in the article. Even in this article where I reflect on action research on a more meta level, it was not possible to anonymise fully the manuscript. Although it is possible to remove my name and references to my work for submission, the manuscript could not be written without providing information readers familiar

with my work could use to identify me. Nor did I try to avoid this, because my preference would have been to leave my name on the manuscript when first submitted.

This raises a question for me about whether blinded peer review should be the standard approach for all journals when we acknowledge forms of research in which the researcher is an integral part of the research process. If the researcher's position, values, experiences, and decisions are central to understanding the research, anonymising the researcher may create a tension between the conventions of peer review and the methodological principles of the research itself.

Concluding Remarks

I have through this article shared both parts of my journey as an action researcher and illustrations of how I have done action research projects and some of the issues I have encountered along the way. Although I have raised some issues and challenges, I believe it is possible to both conduct and publish action research. However, conversations are needed about possible challenges and to share how they can be addressed and potentially resolved. Research by MTEs on changing their practice would benefit from more publications that share not only the outcomes of change, but also the process of getting there, including both pitfalls to be avoided and success stories.

My advice to fellow mathematics teacher educators who have made changes and innovations in their teaching is to use this article as an input when considering how to publish these changes. I encourage colleagues to use the action research principles from McNiff (2016), or similar principles, to structure an account that makes the process of change visible without disguising the values that underpin the research or the role of the researcher herself. Even though there are some challenges that may be encountered in the publishing process, there are ways to meet these challenges. A theoretical framework that can guide and explain choices and changes made can help demonstrate the scientific quality of the research. Choosing publications that are open to innovative methodologies and approaches may also be helpful. Most importantly, however, the research should report on changes that other MTEs may find interesting and useful. For me, the value of an action research article lies in its potential to make meaningful and transferable insights into how MTEs can develop their practice.

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