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Mixed methods research teams: leveraging integrative teamwork for addressing complex problems

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Mixed methods research teams have garnered increased attention for their leveraging of diverse disciplinary and methodological expertise in pursuit of complex problems. We advance our theoretical viewpoint of integrative mixed methods research teamwork as necessary with empirical evidence demonstrating the equipping mixed methods researchers to study complex problems involving interacting systems and lacking known solutions. Integrative mixed methods research teamwork is distinguishable by the purposeful integration of qualitative and quantitative perspectives to generate novel outcomes that are greater than the sum of individual members' contributions. Among the key dilemmas faced by mixed methods researchers wanting to work integratively within a team is the lack of practical guidance for how to get started, how to recognize the emergence of synergistic outcomes, and how to sustain a team's integrative work. To begin addressing this gap, we describe three practical insights gleaned from examining our team interactions and outcomes using a reflection-in-action process during a recent empirical mixed methods case study of literacy practices. In our examination, we test the practical usefulness of a theoretical framework for demystifying the development of a mixed methods research team's integrative capacity. Our insights contribute to refining teamwork practices by identifying enablers of integrative capacity and proposing ways to overcome hindrances that have not been previously elucidated. We argue that the capacity for integrative teamwork is essential for researchers employing mixed methods, allowing them to leverage inherent synergies when addressing complex problems.

KEYWORDS

mixed methods research, research teams, integrative team capacity, complex problems, complexity science

Introduction: integrative mixed methods research teamwork

Teamwork that integrates diverse disciplinary and methodological expertise is increasingly recognized as optimal for addressing more complex mixed methods research problems (Archibald, 2023; Oppert et al., 2023; Poth, 2018, 2019). Mixed methods research is well positioned to address complex problems because it uses innovations in methodology needed to address complexity (Mertens et al., 2016). Complex mixed methods research problems are characterized as involving interacting systems, lacking known solutions, and benefiting from the purposeful integration of qualitative and quantitative perspectives (Poth, 2018). Complicating the work of mixed methods researchers is that addressing complex problems

requires unique sets of expertise and procedures that align with research questions that are difficult to predetermine. We posit complex problems benefit from mixed methods research teams who can effectively integrate individual team member contributions and accommodate emerging understandings of the required expertise and procedures.

Various accounts of mixed methods research team experiences point to challenges (Bowers et al., 2013; Curry et al., 2012, 2013), but a lack of focus on their synergistic potential highlights the need for guidance specific to integrative teamwork. Integrative teamwork has been distinguished from the combined efforts of researchers contributing individually as a group. Instead, integrative teamwork involves interactions that draw upon members' broad diversity in expertise, experiences, and intuition in ways that cannot be predetermined and generate synergistic outcomes that are greater than the sum of individual members' contributions (Poth, 2019). A growing number of authors refer to the presence of 'synergies' emanating from disciplinarily and methodologically diverse teamwork (Curry et al., 2013; Oppert et al., 2023; Poth, 2018), yet their descriptions lack the practical guidance offered in this paper. Among the key dilemmas faced by mixed methods researchers wanting to work integratively within a team involves guidance for how to get started, how to recognize the emergence of synergistic outcomes, and how to sustain a team's integrative potential. By advancing our theoretical viewpoint with empirical evidence, we advocate the importance of integrative teamwork for mixed methods researchers tackling complex problems. We present a viewpoint that such teamwork is essential to leverage the limitless synergistic outcomes that arise from the integration of diverse expertise and lived experiences.

Providing practical guidance for developing integrative teamwork begins with complexity science to create a new, more realistic way to study complex problems (Poth, 2018). As a collective of theories and conceptual tools, complexity science guides the interpretation of interactions and outcomes of integrative teamwork as an organic and holistic process. A recent effort by Poth to demystify the development of a mixed methods research team's integrative capacity advanced a complexity-informed theoretical framework comprising four interrelated elements: membership, contributions, interactions, and performance (Poth, 2019). This departs from more conventional approaches to developing mixed methods research teams in three ways: First, it depicts the team development process as non-linear, with its four elements as interrelated and the teamwork outcomes as emergent and unpredictable. Second, it considers three embedded systems (intrapersonal, interpersonal, and societal) in which teamwork takes place as influencing and being influenced by each of the interrelated elements. Third, it recognizes integrative teamwork as the emergent property emanating from the interactions that can be observed as synergistic outcomes that surpass the sum of individual team member contributions.

To guide others wanting to develop the integrative capacity of their mixed methods research teams, we tested the practical usefulness of the theoretical framework. We begin this paper by describing our team's development process and outcomes from a recent mixed methods case study using a reflection-on-action process. Then, we discuss how the four interrelated elements (membership, contributions, interactions, and performance) of the theoretical

framework together informed our relating of three practical insights to guide the development of integrative mixed methods research teamwork. Our results and discussion should be considered in light of the single empirical mixed methods case study on which this manuscript is based and the transferability of our guidance to other contexts should be further explored.

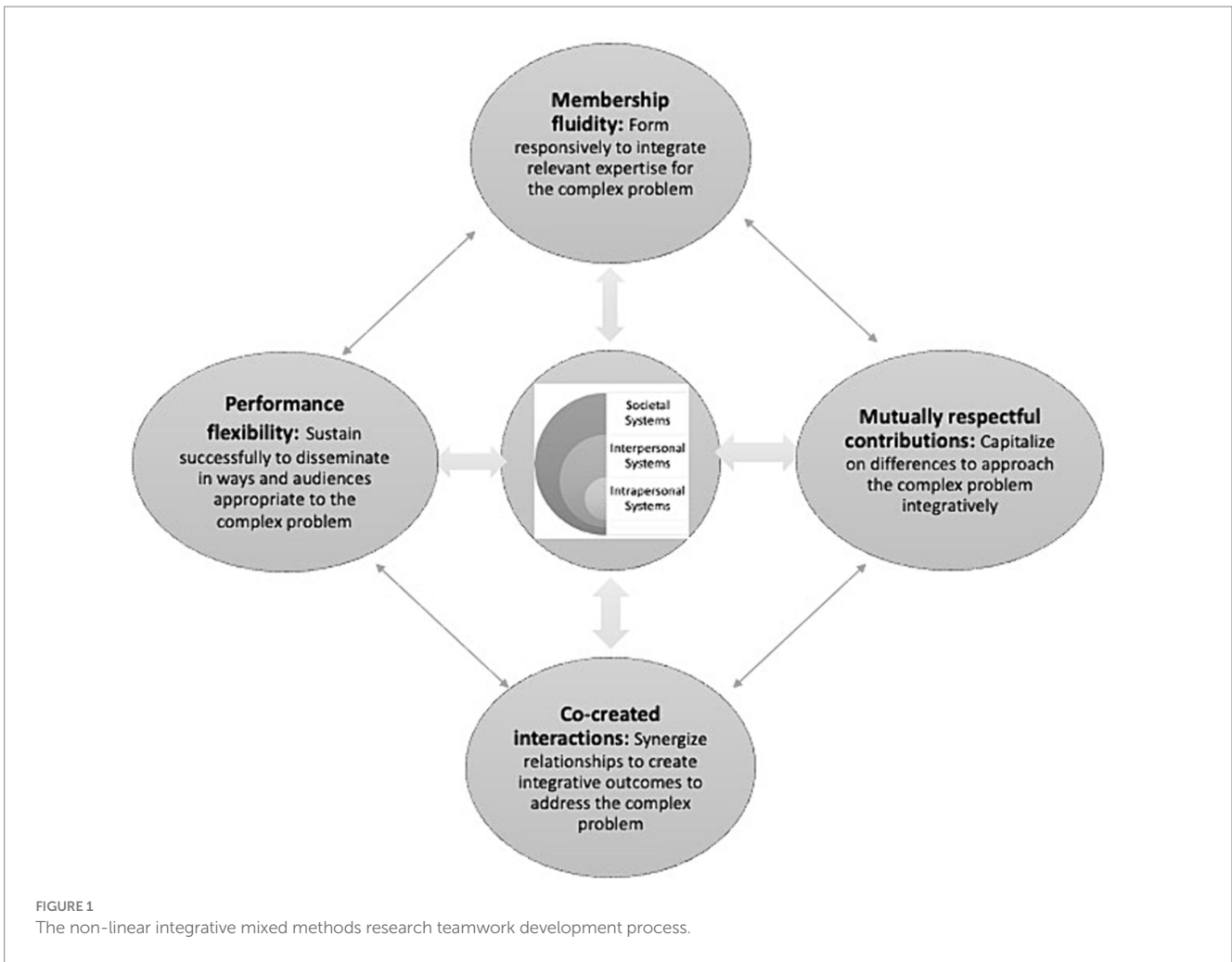
Results: experiential reflection

With the aim of demystifying the development of integrative teamwork, we use the four interrelated elements of the theoretical framework to guide our reflection-on-action process (Mäkelä and Nimkulrat, 2018; Schön, 1991). Our process involved reviewing study documentation created by team meeting notes and personal reflections, identifying key events in our teamwork, and then discussing their significance both as individuals and as a team. Figure 1 visually depicts the non-linear team development process with double-ended arrows linking the four elements of the theoretical framework as the outer circles with each other and as influencing to and by the three embedded systems in which teamwork takes place. Intrapersonal systems describe the individual research team member's influences, such as personal motivations, educational training, and research orientations, on both the societal and interpersonal systems. Interpersonal systems convey the social dynamics and differences in perspectives among members of a team, often attributed to lived experiences involving training and disciplinary backgrounds that influence both the societal and intrapersonal systems. Societal systems include the influences of research priorities as well as institutional influences and world events on both the interpersonal and intrapersonal systems. We represent our novel insights gleaned from our experiential reflection in the Figure in the descriptors of the four interrelated elements.

Membership fluidity

The first element of membership involves seeking diverse team members with the aim of responsively forming a team with expertise, experiences, and perspectives relevant to addressing the complex problem. Our team's complex problem focused on literacy practices with a specific focus on exploring the multifaceted leadership role an effective principal assumed in the deployment of evidence-based literacy practices in their school (Kierstead et al., 2023). The study and our team development took place during the time period of 2020 to 2022 while society as a whole was still grappling with the uncertainty of the global Covid-19 pandemic. The impetus for our teamwork was to address the impact of reading difficulties in early elementary for students who experienced school closures due to COVID-19. It was a call for proposals from teams involving both educational faculty members and school-based community members that led us to recognize the potential of a team that integrated our diverse expertise, experiences, and roles.

From our initial meeting notes, it is evident that we acknowledged the importance of each other's distinct contributions. Each of our four team members brought specialized and relevant knowledge to the complex problem: Georgiou is a world-class researcher on the



prevention and remediation of reading difficulties with extensive experiences working with teachers in the classroom informed by his lived experiences as an elementary teacher and with assessing intervention impacts quantitatively. Kierstead is a school principal with more than 25 years of administration experience and recently completed doctoral studies on addressing reading difficulties by enhancing teachers’ content knowledge and monitoring children’s responses to intervention. Poth is a globally recognized expert in mixed methods research, qualitative research, and case studies whose work in educational settings is informed by her lived experiences as a teacher and administrator. Finally, Mack is a doctoral candidate in counseling psychology with research interests in mixed methods and invention studies. Although our team collectively possessed several qualities associated with success, such as breadth, depth, and history in our specific expertise (NIH, 2018), Poth observed in her field notes that the team’s openness to the possibilities of mixed methods research was notable. This receptivity stemmed from the fact that many team members had prior experience with the necessary integration of qualitative and quantitative research. Poth also observed that the team exhibited a ‘good rapport,’ an understanding of the necessity for ‘fluidity’ in our involvement, and a willingness to engage with one another. When our team began forming, some members already had existing relationships, though they had not interacted as a group. For

instance, Georgiou and Poth had been colleagues in the Faculty of Education for more than a decade, Georgiou and Kierstead had collaborated for more than five years working within school communities, and Mack had recently taken two courses instructed by Poth. We recalled that during our first meeting, identifying our diverse expertise was facilitated by the previously established relationships among us.

Unbeknownst to us, our team membership would remain stable throughout our study. The source of fluidity would not be in membership but rather in terms of the intensity of member involvement throughout the study. In Poth’s broad experience, many scenarios required new members to be sought, including but not limited to the arising need for specific expertise, graduate students moving on to other opportunities, or those working in schools who could no longer focus on research.

Mutually respectful contributions

The second element of contributions refers to building respectful relations with the aim of capitalizing on team member differences in perspectives relevant to the complex problem. Our case study mixed methods design involved integrating the lived experiences of 11

school staff (principal, learning support teacher, and classroom teachers) with the reading scores of 122 Grade 1 to 3 students in Alberta (Canada). As a reading consultant and researcher, Georgiou was well-known in the local educational community for his work with teachers and advocacy for curriculum changes relating to literacy. As a school-based principal in the local community, Kierstead worked daily with teachers and brought intimate knowledge of the types of challenges they were experiencing during the rapidly changing COVID-19 pandemic context. Key to our study's feasibility was leveraging Georgiou's ongoing collection of student reading data and Kierstead's insight on the best way to organize the focus group data collection with school staff. With extensive experience collecting qualitative data, Poth and Mack worked together on the focus group protocols to tailor them to the different participant groups. Not surprisingly, challenges emerged related to competing interests that needed to be resolved. For example, the draft protocols were reviewed by Georgiou, with his feedback focused on what would be relevant questions for reading and by Kierstead for what would be relevant questions specific to the different principal and teacher roles and what time they could dedicate to our study. In so doing, we capitalized on our different perspectives to help focus our data collection activities and demonstrated mutual respect for our differing but complementary contributions. During our team reflection, we reviewed some of the challenges attributed to differing disciplinary perspectives (Bowers et al., 2013; Bryman, 2006; Szostak, 2015). We surmised that our teamwork was helped by our common training in the field of educational psychology. Still, we also recognized the challenges that our differing epistemologies introduced to our work together. For example, all four had initial training in quantitative methods where we had assumed a more post-positivist viewpoint; Poth and Mack's orientations now assumed a more constructivist viewpoint reflective of their qualitative experiences. We agreed that our commonalities in training helped us recognize the nature of these differences and navigate our differences in ways that might not be possible for others.

What is likely to be a shared challenge with other research teams is the challenge our team encountered with busy schedules, prompting us to recognize the crucial role of computer-mediated meetings in overcoming this obstacle. We found opportunities to discuss how adjustments of individual contributions are essential to our teamwork success.

In the data collection phase, Georgiou and Kierstead led the gathering of student data, while Mack focused on collecting data from school-based personnel through focus groups. Poth assumed the role of team taskmaster, organizing and overseeing the integration of student data with staff focus group insights. Poth's request for regular meetings to check the progress of data collection and later to discuss integrated outcomes introduced a note of tension to the group dynamics. Virtual meetings emerged as a pivotal solution, facilitating frequent team meetings and demonstrated by our commitment—no scheduled meeting had ever been canceled. The team collectively interpreted this commitment as a sign of our dedication to the project. To underscore our commitment, Georgiou and Kierstead recalled joining a meeting in a car while traveling home together after meeting with teachers.

According to Poth, educating the entire team about the time and expertise required for credible integration was an ongoing and crucial

effort in establishing realistic expectations for deliverables. Notably, our early identification of the need to integrate quantitative student data with qualitative school personnel data in our funding proposal allowed the team to focus on a mixed methods design. Upon reviewing our meeting notes, it was evident that individuals gradually shifted their emphasis from individual contributions to a shared focus integration. These frequent opportunities to meet and listen to one another helped build mutual respect for our unique contributions and realize our synergistic potential.

Co-created interactions

The third element of interactions revolves around the co-creation of productive team routines. It is essential to highlight the sources of tension experienced before, during, and after meetings. Acting as the taskmaster, Poth sent agendas a few days before a scheduled meeting as a way of reminding team members of the meeting purpose and preparation expectations. Team members generally found these agendas helpful, ensuring that each team member had an opportunity to articulate their contributions and to seek feedback. However, there were occasions when the agendas were perceived as potentially constraining. It's noteworthy that, due to the dynamic nature of our teamwork and meetings, no two agendas were alike. Team members stressed the importance of allowing the agendas to evolve alongside the changing meeting purposes. In practice, the agendas were seldom followed as outlined initially. Instead, the team demonstrated an ability to adapt, with this flexibility being recognized as fostering the flow of natural conversations and allowing for the emergence of new insights that might have been missed if a rigid schedule had been strictly adhered to. The manageable size of our four-member team was also noted for its facilitation of meeting scheduling and more fluid interactions. However, one team member expressed curiosity about the scalability of this approach to a larger, more diverse group.

Team members perceived meetings as significantly impacting their understandings as the team collectively navigated a path forward through back-and-forth discussions. The opportunities for interactions were also regarded as instrumental in building a shared identity and accomplishing the study's integration goals. Mack noted that the team meetings demonstrated that while individual contributions were necessary to the study, it was insufficient for individuals to work alongside each other. Team meetings were instrumental in clarifying understandings and identifying the next steps. A review of meeting notes indicates that team members relied on each other's expertise to undertake the merged mixed analysis strategy that revealed four interdependent influences pointing to novel understandings of principal contributions to a school literacy culture (Kierstead et al., 2023). Such novel findings emphasize the possible benefits of diversity, dissonance, and divergence in exploring methodological puzzles in mixed methods research (Archibald, 2016). The team identified the sign-off process during manuscript submission as a pivotal moment where the study's goal was realized. This process involved each team member confirming their comfort with the interpretations and conclusions as written, marking a crucial point in the development of the team's integrative capacity (Bowers et al., 2013).

Performance flexibility

The fourth element of performance highlights the need for sustaining team integrative performance and points to the need for prioritizing communication to enable the team to be flexible. Mack described a meeting that took place during data collection where it became clear from the analysis of focus group interviews that some of the participants were using the materials in different ways and to varying degrees in their classrooms. During the meeting, the team considered the importance of these differences and how best to move forward. Similarly, our team's original timeline and plans for dissemination shifted in response to the outcomes that were generated by our integration. Our findings shed light on the complexity inherent in the roles of principals and their interactions with others in developing evidence-based literacy school cultures that improve students' performance. This was not easy to achieve, and it took several discussions and creative thinking about how the interactions of the principal were both influencing and being influenced by others. We found being flexible with one another about the time needed to perform as a team and the audience for the deliverables as necessary.

In our teamwork, communication systems involving meetings and emails emerged as essential to sustaining interactions and conversations. Not surprisingly, we found our most 'useful' and innovative ideas came about not on email but in 'real-time' virtual meetings. We were fortunate that our team agreed to continue working together beyond the short timeline of funding. Despite facing fluctuations in availability due to competing commitments, we remained steadfast in our dedication to making our findings accessible to our audiences.

Discussion: integrative teamwork practices

To better equip researchers for tackling new challenges that demand innovative solutions, we advance three teamwork practices centred on developing communication systems, engaging in reflexive questioning, and attending to emergent properties. Effective communication represents a well-described and essential enabler for mixed methods research teams. Similar to other documented accounts (Oppert et al., 2023), our team development benefited from the availability and use of computer-mediated communication technologies. In particular, the seamless integration of online team meetings and shared access to meeting documentation proved invaluable. These tools facilitated frequent interactions among team members and the building of shared understandings. Utilizing agendas as a starting place to guide meetings and meeting notes to document the next steps for accountability purposes, our team managed to avoid some of the common frustrations associated with differences in project management approaches among team members. Together, this approach allows the team to focus on developing their integrative capacity.

Reflexivity, as a practice, involves researchers explicitly acknowledging their contributions to study decisions and understanding how these contributions influence the research process (Creswell and Poth, 2024). The insights gained from our team reflexivity practices

underscore its value in fostering awareness and understanding of one's positionality (Popa and Guillermin, 2017) and the lenses the team brought to our mixed methods case study. Through engaging in team reflexivity, we came to recognize our growing reliance on each other's expertise to realize our shared vision and transcend our individual boundaries. This realization contributes to our understanding of boundary transcendence and the potential of integrative teams to generate innovative solutions to complex problems and expand the existing knowledge in this practice area (Hesse-Biber and Johnson, 2013).

Grounding our work in a recent theoretical framework informed by complexity science helped bridge theory with practice and inform the preparation of future educational psychology researchers for effective and integrative teamwork by bringing attention to the emergence of synergistic outcomes. This discussion seeks to extend Poth's initial attempt to introduce the concept of emergent opportunities in mixed methods research, which we acknowledge that we still do not fully understand (Poth, 2019). Growing evidence points to its underpinning role in the development of integrative capacity: Our own experiences highlight that emergence is not something that can be executed by members of a mixed methods research team based on a plan. Rather, as we experienced, team members have to be attentive listeners and responsive to conversations that appear to be leading to new understandings beyond what could have been achieved by individuals. The continual adjustments we sought in our procedures, expectations, and the ways in which we worked together were necessary, yet adopting such a mindset and way of working takes work. A mindset of continual adjustments is challenging for many researchers to adopt, including us, given that much of our methodological training has assumed stability in the context and has focused on careful planning and implementation of research plans. By sharing this perspective, we hope to inspire others to describe how their team developed, the nature of their teamwork, and the insights they gained. We aim to help mixed methods researchers realize their synergistic potential for addressing complex problems.

Data availability statement

The datasets presented in this article are not readily available because meeting and team reflection notes are not publicly available. Requests to access the datasets should be directed to Cheryl Poth cpoth@ualberta.ca.

Ethics statement

The studies involving humans were approved by the Ethics review board of the University of Alberta. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

CP: Conceptualization, Formal analysis, Funding acquisition, Writing – original draft, Writing – review & editing. GG: Data

curation, Funding acquisition, Writing – review & editing. EM: Writing – review & editing. MK: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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