Qualitative Health Research
2016, Vol. 26(5) 649–658

DOI: 10.1177/1049732316634304
qhr.sagepub.com
SAGE

Doing Interdisciplinary Mixed Methods Health Care Research: Working the Boundaries, Tensions, and Synergistic Potential of Team-Based Research

Sharlene Hesse-Biber[1]

Abstract

Current trends in health care research point to a shift from disciplinary models to interdisciplinary team-based mixed methods inquiry designs. This keynote address discusses the problems and prospects of creating vibrant mixed methods health care interdisciplinary research teams that can harness their potential synergy that holds the promise of addressing complex health care issues. We examine the range of factors and issues these types of research teams need to consider to facilitate efficient interdisciplinary mixed methods team-based research. It is argued that concepts such as disciplinary comfort zones, a lack of attention to team dynamics, and low levels of reflexivity among interdisciplinary team members can inhibit the effectiveness of a research team. This keynote suggests a set of effective strategies to address the issues that emanate from the new field of research inquiry known as team science as well as lessons learned from tapping into research on organizational dynamics.

Keywords

teamwork; health care; interprofessional; methodology; power; empowerment; qualitative

Introduction to Interdisciplinary Team-Based Mixed Methods Research

We are in the midst of a health care research revolution. Ways of conducting health care research projects are dramatically changing as the range of scientific problems and delivery of health care become increasingly complex, often requiring the shifting of research inquiry from discipline-specific to collaborative interdisciplinary team-based research models (Loeb et al., 2008). There is a growing belief that the creation of an open set of interdisciplinary research relationships and structures will encourage innovative research environments that can offer possibilities to ask new research questions and bring together researchers who possess a diverse set of methods and technological tools.

Mixed methods research is positioned to play an important role in interdisciplinary research inquiry. The synergistic potential of mixed methods research provides the flexibility and power of inquiry needed to tackle complex analytical and interpretative issues, given its multimethodological pragmatic approach and wide range of applications.

Engaging in interdisciplinary research means that individual researchers housed in disciplinary environments begin the process of "de-disciplining" and re-integrating their research praxis and identities as they shift their research inquiry to a collaborative model of research—a revolutionary inquiry shift. They experience what it is to *work the tensions* that lie within the space between disciplinary borders. This type of work may remove them from their *methods and paradigmatic/theoretical comfort zones.*

To engage with interdisciplinarity is to navigate and negotiate with differences at many levels. At the disciplinary level, university structures that once primarily supported disciplinarity must shift their mission to accommodate, support, and reward this collaborative type of work. This may create tensions at the structural level, as disciplines fight for their turf and as colleges, universities, and others like funding agencies and

[1]Boston College, Chestnut Hill, Massachusetts, USA

Corresponding Author:
Sharlene Hesse-Biber, Professor of Sociology, Boston College, McGuinn 419, 140 Commonwealth Ave., Chestnut Hill, MA 02467, USA.
Email: hesse@bc.edu

journals with requirements for publication, all must re-calibrate their reward systems. The degree to which they will negotiate this new set of rewards will dictate the growth of a vibrant interdisciplinary research community.

Take a hypothetical example: You are called upon to tackle the growing problem of resistance to antibiotics in hospital settings. You need to address a range of critical issues stemming from the recent outbreaks in your geographical region, which will require changing the antibiotic-prescribing patterns of clinicians. In addition, you will figure out how to reduce the public's demand for antibiotics, as well as exploring alternative treatments. You must approach the overall issue with a multifaceted approach, one that will be the interdisciplinary link between biologic, bio-behavior, and health researchers, and maybe the expertise of a medical sociologist. You gather a team of experts together to tackle this complex prevention and control of the antimicrobial problem, yet we know that interdisciplinary team engagement is not always effective: "The increasing rates of antimicrobial resistance may be a reflection not only of increased host susceptibility, but also of the need for more comprehensive interdisciplinary approaches including the social and biological sciences" (Larson et al., 2005, p. 411).

To answer such complex issues, we find the need for interdisciplinary approaches and mixed methods–appropriate tools. If we know interdisciplinary mixed methods research teams fail to live up to their research promise, why do we lack structures that can train the next generation of scholars in this type of model? Although there are some exciting new interdisciplinary research models and trainings that receive funding from foundations and government agencies, these initiatives remain at the margins of universities and wider research communities.

An even more striking concern is that interdisciplinary teams often do not understand which interdisciplinary structures promote vibrant team dynamics. Models that explicate this are often sequestered in schools of management offering specializations in organizational team dynamics. In addition, a new guide to this problem may be found in the discipline of team science, an emerging field focused on the evaluation of collaborative initiatives. Team science explores factors associated with successful, multilevel scientific collaborations by utilizing a variety of micro-, meso-, and macro-level analytic strategies (Luke et al., 2015).

Potential Mixed Methods Interdisciplinary Challenges

I argue that researchers *do not practice interdisciplinarity well*. This is because, in part, they do not actively seek out ways to tap into the potential synergy of a team-based mixed methods project. They ethnocentrically do not see past their own comfort zone or horizon for theories, questions, and methods. I further argue that there is a *lack of conscious reflexivity on the part of the research team*; instead, the team often buys into the idea of "inherent" synergy contained in these types of research configurations and designs. *Working in a group does not necessarily mean that you are working as a team*. Vogel et al. (2014) cite conceptual and scientific challenges as well as discipline-based differences in values, terminology, methods, and work styles as two major challenges to the undertaking. Through facilitating factors such as initiative characteristics that support team science and bridge-building activities in research centers, groups can overpass these obstacles. Team skills require practice and development, and success is measured by the achievement of the team as a whole.

First, what do we mean when we say we are participating in interdisciplinary research? It is often the case that researchers working in teams are maintaining an illusion of interdisciplinarity without working together. It is important to define interdisciplinary research, as this term has often been confused with another term: *multidisciplinary. Interdisciplinarity* is a process that combines knowledge from one or more disciplines and occurs when scholars collaborate with the goal of synthesizing new knowledge from other disciplines. Interdisciplinary work involves creating of ideas, tracing reasoning, and seeking multiple understandings, whereas disciplinary engagement consists of taking a specific action, converging ideas, and defending a position. Where interdisciplinarity is process oriented and open to new mixed methods designs to answer research questions, disciplinarity relies on disciplinary methods and linear thinking. Disciplinary engagement is made up of individualistic thinking, whereas interdisciplinary engagement relies on the power of the group. Klein and Newell (1997) define interdisciplinarity as follows:

> Interdisciplinary studies may be defined as a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline or profession. Interdisciplinary studies draws on disciplinary perspectives and integrates their insights through construction of a more comprehensive perspective. In this manner, interdisciplinary study is . . . complementary to and corrective of the disciplines. (pp. 393–394)

Contained in this definition are the beginnings of guidance for building a way toward an effective interdisciplinary praxis, one that calls for working in an integrative team-based manner. Researchers working in interdisciplinary realms must demonstrate a range of relational skills that foster interdisciplinary engagement as opposed to disciplinary engagement.

Moving From Disciplinary to Interdisciplinary Team-Based Research

The ability of team members to move between interdisciplinary and disciplinary modes of knowledge building—*integration*—is then a defining element of interdisciplinarity. However, discipline-based team members tend to have difficulty reaching beyond their own ways of thinking about a problem and rely, instead, on the given discipline-specific paradigmatic model. Any given interdisciplinary team, then, must begin with an understanding and appreciation of their different researchers' standpoints: the attitudes, values, and paradigms from their training.

If there is not this type of shared understanding of the "other," team members may focus their engagement at the methods level by focusing their attention on the different methods team members bring into a project without discussing the variety of insights and questions different team members can bring to a complex research topic. When this happens, teams are placing "the cart before the horse."

Some organizational theorists call this the T design problem, whereby team members never achieve a "T" design (broad and deep) because they forfeit interdisciplinary depth by not tapping into the range of new questions from various disciplinary team members. Hence, they do not effectively cross disciplinary borders.

Higonett (1994) uses the anthropological term *contact zone* to depict the interactions and engagements of scholars working at disciplinary borders that are not "static lines of demarcation" but "improvisational and interactive." A border "localizes what it strives to contain or release. It is rarely a smooth seam." Borders are sites of innovation "of rupture, connection, transmission," and those working at the borders begin to "move beyond one-way questions" (Higonett, 1994, pp. 2–3). In other words,

> Working right at the limits of several categories and approaches means that one is neither entirely inside or outside. One has to push one's work as far as one can go: to the borderlines, where one never stops walking on the edges, incurring constantly the risk of falling off one side or the other side of the limit while undoing, redoing, modifying this limit. (Minh-ha, 1991, p. 218)

A second primary element critical for creating a robust interdisciplinary team is a willingness of team members to engage in *a transformative process*—meaning that the goal of working interdisciplinarily is to engage in a process of *deconstructing disciplinary knowledge*. Another objective is transforming your *researcher identity*, as both are then *re-configured into new knowledge and action*. Interdisciplinary work is thus a form of weaving knowledge together into a new and complex pattern of understanding. Addressing this part of the definition is central to the successful praxis of interdisciplinarity, yet is not often addressed.

Progress can only be made if there are new interdisciplinary networks formed to link discourse activities. Irvine, Kerridge, McPhee, and Freeman (2002) point out that diverse interdisciplinary team relationships remain characterized by conflict with little cooperation due to suspicion that arises between different disciplines from a clash of very different "practice ideologies." They further suggest forging new interdisciplinary networks that are attentive to team-based goals. For now, there remains a continued lack of awareness that requires research identity transformations as team players from those hailing from different disciplinary standpoints—a process that is difficult to execute in practice.

The practice of any method is surrounded by *ecology of methods praxis*. This idea calls for an awareness that research methods are embedded in social context/community relational networks. Law, Ruppert, and Savage (2011) refer to this context as "methodological issues.". They note,

> We need to understand that methods inhabit and help to reproduce a complex ecology of representations, realities and advocacies, arrangements and circuits. So survey methods . . . inhabit and reproduce ecological forms that fit more or less comfortably together. And, this is important, as these are patterns that don't take kindly to being disrupted. The implication is that there's a kind of triple-lock at work here. And this, if it's right, makes it very, very, difficult to know differently, to shape new realities or to imagine different "methods assemblages" or modes of knowing . . .. For all these have to be shifted together. (Law, Ruppert, & Savage, 2011, p. 13)

Working from an interdisciplinary framework calls into question disciplinary categories of analysis as they are disrupted by the rich meanings brought to them, as seen in the reassessment of theoretical constructs in your discipline—like the term *evidence* or *experience*. How tightly bound are you to your discipline, its theories, and methods?

Learning to do your disciplinary work is a *relational process that consists of acquiring a "mental model" that becomes your researcher identity.* If it is an identity that has already been created by others in your discipline, that attitude is often adopted by your disciplinary work. Another aspect to developing a mental model of disciplinary identity is the *discourse* that surrounds attributes associated with *being in your discipline*—This may be hard to re-conceptualize as you move into a more interdisciplinary environment.

Although conducting an interdisciplinary research project sounds auspicious, and the synergy contained in

the application of multiple methodologies sounds promising, many of these projects fall short of their potential. Team-based research still lacks the *means and knowledge about what makes interdisciplinarity and a mixed model approach effective.* Why?

Critical Barriers to Team-Based Mixed Methods Interdisciplinary Research

Inherent faith in synergy. One important barrier to the praxis of effective mixed methods interdisciplinary research is *magical thinking* about its inherent power. There is a faith expressed in the prior synergistic quality of interdisciplinary work and mixed model designs (much like the belief in randomized controlled trials [RCTs] as a gold standard of empirical research). This faith also extends to the praxis of mixed methods, wherein much interdisciplinary work occurs.

There is a specific discourse surrounding the deployment of mixed methods that discusses the *inherent synergistic qualities* that arise when different methods are used in the same study, independent of any discussion of mixed methods designs' links to any specific research context. Researchers across different disciplines have framed the synergistic promise of mixed methods research:

> Numbers and a story, succinctly illustrate the appeal of MMR, because the combination of both general numeric findings and specific cases exemplifying those findings generate a synergy that neither can alone. It is the generation of new knowledge that goes beyond the sum of the QUAL and QUAN components that makes MMR so valuable in understanding social phenomena, such as educational effectiveness. (Creemers, Kyriakides, & Sammons, 2010, p. 116)

> The mixed methods research design capitalizes on the uniqueness of quantitative and qualitative differences, while also capitalizing on the synergy between the two approaches. (Davis & Leppo, 2010, p. 67)

Each depicts "mixed methods" as possessing an "inherent" synergistic power by its research deployment alone. These quotes also describe the juxtaposition between qualitative and quantitative methods as a potential causal explanation for a mixed methods synergistic outcome that belies in the "fact" that one method offsets the weaknesses of the other. Creswell and Plano Clark (2007) cite this weakness logic and note it as a strength:

> . . . quantitative researchers are in the background, and their own personal biases and interpretations are seldom discussed. Qualitative research makes up for these weaknesses. On the other hand, qualitative research is seen as a deficient because of the personal interpretations made by the researcher . . . the combination of both approaches can offset the weakness of either approach used by itself. (p. 9)

This offsetting "weakness logic" rationale remains under-theorized and lacks reference to concrete empirical examples. Even if we assume all methods have their weaknesses, it is possible to address the weaknesses of each first before bringing each into a mixed methods design. In addition, those who discuss the superiority of mixed methods designs do not empirically demonstrate how bringing two different methods together creates synergy. Missing from this discourse is any discussion of the incommensurability of using methods whose philosophical assumptions are incompatible.

In addition, none of these quotes mention the research problem guiding the selection of a particular research design. Instead, the mixed methods design appears to be the "driver" that makes synergy happen. In this sense, mixed methods are the primary component that drives research toward a synergistic outcome. This is not to deny that in some instances synergy does take place, but given the de-contextualized "universal" discourse of synergy, an opportunity is missed to describe the conditions that foster synergy. Synergy is not a given. It is *a process* that must be worked on and experimented with, and the exact nature of the process is not the same for all interdisciplinary team-based projects.

Without tending to interdisciplinarity and its call for mixed model research skills, research members often either revert back to their disciplinary ways of knowing or practice "multi-disciplinarity," which takes place when a researcher "adds and stirs" information. In this case, there is little integration between disciplinary knowledges. Team members remain in their disciplinary silos—often publishing findings from their "team-work" in parallel—whereas some publish their work in a qualitatively driven journal and others in a quantitatively driven journal. This multidisciplinary work remains unintegrated and isolated, even though they may jointly collect data and note that their work is also connected to the "other's" work.

O'Cathain, Murphy, and Nicholl (2008) examined 81 mixed methods research articles published in the field of health services funded by the U.K. Department of Health and appearing on the department's research website. O'Cathain et al. created two indicators that measured the level of integration between reported qualitative and quantitative methods as detailed in a study's research findings. Their analysis of the level of integration contained within these studies revealed little integration of research findings: Only 21% of the studies mentioned any integration of their findings, and only 28% were found to somewhat integrate findings. The overall analysis showed that integration of qualitative with quantitative findings uncommon, especially at the publication stage. In addition, it was difficult to discern exactly how utilizing qualitative and quantitative methods added synergy to the research project. As is well known within the

mixed methods research community, many mixed methods research projects still remain "unmixed," with little interaction between the two methods and the continued publication of parallel quantitative and quantitative components (Bryman, 2007; O'Cathain, Nicholl, & Murphy, 2009).

Valuing qualitative and quantitative methods. Some mixed methods researchers such as Giddings (2006) voiced concern about the marginalization of qualitatively driven approaches—that much of mixed methods research stemmed from positivistic methodology and qualitative components played secondary roles. Others within the mixed methods community, such as Creswell, Shope, Plano Clark, and Green (2006) and Mason (2006) disagreed, citing empirical mixed methods research that prioritized qualitative research in mixed methods designs. The debate on dominance of specific mixed methods research designs continues, but the increasing shift to an "audit model" of accountability in knowledge building and the growth of evidence-based practices may also serve to limit the role of qualitatively driven, team-based mixed methods research components.

An unintended consequence of not integrating methodologies and methods approaches is that some approaches to problem areas remain trivialized within team-based environments. In some cases, qualitative approaches still face a lack of understanding; often, qualitative results are confined to "providing some illustrations" for quantitative findings (O'Cathain et al., 2008). O'Cathain et al.'s (2008) research reveals the mutual disrespect for different methodologies among interdisciplinary teams as a whole:

> Interviewer: How did [some of the quantitative researchers] show their lack of enamor?
>
> Interviewee: By asking the same question all the time, the same questions all the time, I suppose [laugh]. Well it's about sort of representativeness and whether sort of smaller samples could be, and what you can get out of it. (p. 1581)

In some cases, qualitative research was dismissed altogether, as quantitative team members believed that such data were not useful. O'Cathain et al. (2008) describe how qualitative team members felt they were ". . . not being given the time to discuss their work within team meetings, not being consulted about articles that emerged from the study, or being continuously asked to justify their methods" (p. 1581). One qualitative team member discusses the idea of contamination by different data types:

> [the project lead] was worried about issues of contamination within the trial . . . there were issues about we're getting information from the qualitative, what do we do with it, because if we were just doing a trial we might not have had that information in that way, and how do we act on it? . . . So in terms of whether, I don't think I had the same concerns about contamination. (O'Cathain et al., 2008, p. 1583)

A specific illustration of this issue applied to the field of health care is the research projects that pertain to the study of injecting drug users (IDUs). Qualitative components are often subordinated and page restrictions in top addiction journals limit detailed reports of complex data collection and analysis logistics, thus minimizing the fuller scientific potential of genuine mixed methods.

One concern is that, as the field of mixed methods moves toward further bounded reification of the concept of what it means to mix methods, the role of qualitative approaches to mixed methods research may diminish. In the movement to solidify the mixing of qualitative and quantitative methods, those quantitative methods and methodologies whose paradigmatic assumptions are closer to a nomothetic set of assumptions may prosper to the detriment of those qualitatively driven approaches whose basic assumptions derive from idiographic, contextualized frameworks. Furthermore, marginalization of single method and disciplinary research may threaten the merits of specialization. Remaining structural barriers exist within the disciplines themselves and hinder the effectiveness of team-based interdisciplinary mixed methods research.

Structural barriers to team-based research. Structural barriers remain an important factor that can impede effective interdisciplinary team-based mixed methods research. Despite privileging a discourse that speaks of interdisciplinarity as a core value and promoting interdisciplinary knowledge building that is expressed and shared by researchers, research training remains enmeshed in separate disciplines that contain individual core values that shape researchers' professional identities. Professional cultures also determine one's professional success and the types of research that count toward professional success. McNair (2005) notes that there is often a competitive model promoted in relation to other professions, that often hinders the development of respect between different professional disciplines that makes them ill-prepared for interprofessional team-based research. This is often compounded within professional cultures as they become diversified in terms of gender, class, and racial/ethnic differences.

What are the incentives for conducting integrative disciplinary research when the structure of knowledge, power, and rewards still resides within disciplinary silos? Will stakeholders buy into this type of integrative teamwork? How can we maintain the funding it will take to design effective interdisciplinary research teams? Or are we only funding what some have termed a *superficial interdisciplinarity* (Stozak, 2015)?

Engaging in this form of research requires a new funding model wherein stakeholders value a range of paradigmatic ways of knowing beyond positivism and research that does not marginalize qualitatively driven approaches. In this model, journals must expand their word counts to make room for sufficient description of mixed methods methodologies and methods.

Practical Considerations for Effective Team-Based Research

Developing team composition and diversity. Here are some factors from the field of organizational dynamics that might be important to have in a team as exhibited in any given team member's personal character. The following characteristics are said to be helpful for building a strong team: being open to new ideas, curious, able to deal with the complex issues, able to stick with something difficult and out of their comfort zone, and good with time management.

An individual in O'Cathain et al.'s (2008) study of the problems and prospects of effective team-based mixed methods research disclosed the following group dynamics:

> I think the other thing is respect for the different disciplines, because you can pull together a group of people from different disciplines into a study, and you can make, you know you can make, I mean if you run the study without respect for those other disciplines then those disciplines don't fare very well. . . . So you can do a lot with just making sure the disciplines feel respected and equal. (p. 1251)

When considering members who might lead a team, there is no one recommended leadership style. More importantly, leaders demonstrate some of these personality characteristics and strengths: able to accept feedback from team members in a productive way, able to be inclusive and empower others on the team, able to listen to others, and able to provide team members with difficult feedback in a way that does not alienate them or create dissension. Individual motives should also be considered in team building.

Defining expectations and maximizing communication. Establishing a clear set of roles and expectations for all group members is important. To make this happen and set ground rules when creating a team, the primary step is to assign a leader. This figure will then distribute the work among members, maintaining balance in equivalency–fairness, ability–training–experience, and time and effort. The leader is instrumental in ensuring quality work and managing the team.

Team dynamics, especially in terms of what specific expertise is needed, should also be considered. It is critical to select the right disciplinary expertise that will interface with the overall complexity of the research question, as well as to find a balance that will enable the team to have the range of perspectives and skills needed to successfully complete the research. In a study of HIV infection among ethnic minorities in the United States, a team-based research project found that working on empowering the group through active group decision making and building in cohesive strategies as well as recruiting an ethnically and racially diverse team were critical factors in promoting interdisciplinarity (Polanco et al., 2011).

Projects' failures may be due to complex causes, which is why it is essential to probe the reasons behind the matter when addressing conflicts. These include competing personal goals or expectations, lack of contact or communication, poor planning processes, unfair distribution of work, poor use of team members' skills for tasks, missed minor deadlines, dominance of the group by one or more members, disjointedness as a result of lacking coordinated finishing processes, or "freeloading," whereby a group member deliberately avoids contributing.

Determining group size and communication dynamics. Group size is another factor that can contribute to successful interdisciplinary team-based research. Having between four and six members is ideal. Giving the a name, a roster with contact information, member introductions, ground rules, and operational issues will also contribute to the building of strong ties.

Providing ways to enhance communication across disciplinary divides is also helpful. Not all team members speak the same language; they may use the same words, but their meaning and context may differ. An understanding of researchers' standpoints may serve to offset this tendency toward disconnection. The "epistemological challenge" is to combine diverse world viewpoints and ways of knowing while maintaining individual disciplinary integrity (Mills, Gill, Sharp, & Franzway, 2011). An appreciation of the potential contributions of different methodological viewpoints is necessary for deeper integration of mixed methods designs. Otherwise, difference is treated as "addition" or even "omission," but not integration.

Thus, the team should collectively redefine common terms, as a definition negotiated by team members is a determinant of success, and build team solidarity and the trust needed to step beyond one's disciplinary context. Facilitating a common language can be fostered by the use of loosely bounded concepts that allow for usage innovation without restricting team members to stringent conceptual rules. Loosely bounded concepts also are attentive to issues of contextualization, meaning that they take into account the given social milieu—for example, issues of racial, ethnic, gender, cultural, and discipline-specific

differences. Loosely bounded concepts allow for fluidity of meaning and defend against concept reification.

There is a contested dialogue around the concepts' boundaries, with movement of the boundary line, openness, awareness, and honoring of working against binary thinking. Medical historian Lowry (1992) argues for the utilizing of loose "boundary" concepts because they allow researchers to communicate with one another, especially across disciplinary borders and are important in fostering interdisciplinary research. She notes,

> Loosely defined concepts which, precisely because of their vagueness, are adaptable to local sites and may facilitate communication and cooperation . . . make possible the interaction of distinctly scientific cultures and thus permit the construction of a given segment of knowledge, while on the social level they facilitate the development of intergroup alliances and therefore advance specific social interests . . . . [They are] negotiable entities that simultaneously delimit and link particular territories: the domains of professional expertise. (pp. 374–375)

Balancing time, commitment, and active listening. Organizational group dynamics experts say that building a team takes time to "settle in." The process is about finding a balance between autonomy and collectivity. Organizational theorists note that, although fostering a team spirit of cooperation is beneficial, there are cases where collaboration can be hindered by rigid groupthink mentalities. It is important not to censure team members or discourage the disruption of group harmony—Try to avoid the "tyranny of the team." Buying into a collective vision starts with the research problem. Moody and Nelson (2013) stress the importance of a *"radical interdisciplinarity"* that assumes that disciplines enter into an "equal partnership," such that one discipline is not favored over another to enhance non-hierarchical ways of thinking and knowing. Radical interdisciplinarity suggests privileging differences among team members such that they tap into their respective areas of expertise in a group setting.

Allocation of roles should be negotiated clearly, openly, and iteratively during the research process. Do team members agree which issues, concepts, and variables should be examined and which theoretical perspective will be deployed? An effective group dynamic can be achieved through these communications strategies: (a) actively listen to others without interrupting and be respectful of others' contributions, (b) be clear about your rationale when sharing ideas and be aware of your tone and body language, (c) give feedback without reacting in a negative way and be open to differing points of view (Dyer, Dyer, & Dyer, 2013). Transparency is essential across procedure, both in the context of discovery (formulating research questions) and justification (deploying methods), but advocating for transparency does not depend on formal praxis guidelines.

Appreciating paradigmatic disciplinary differences. Effective team-based interdisciplinary research brings an understanding of "methodological" differences to diverse team members. Disciplinary differences often move teams toward taking a "practical pragmatic approach" that stresses a "what works" perspective that sidesteps the hard "epistemological issues" of a "philosophical pragmatic" approach. Delinking pragmatism from its philosophical approach glosses over paradigm incompatibility issues that are often the root of conflict between team members who do not share the same perspective. Applying a "practical pragmatic" stance (such as the default "one size fits all" theoretical perspective) to a team-based project erases important differences and has implications for the research goals. Ignoring difficult incompatibility issues may undermine project goals and team member communication. Greene (2008) critiques practical pragmatism's implication that evidence replaces truth, yet it is unclear how to decide what evidence warrants the status of "truth."

For philosopher John Dewey, truth getting was a process determined by its "self-correcting" element. As new evidence was garnered, truth was "revised" and open to refutation. Such a process was deeply embedded and influenced by a moral community whose viewpoints comprised a set of transactions: "Truth" was the result of transactional assessments within this wider community. Flexible and self-reflexive methodological procedures allow researchers to seize strategic opportunities to document unexpected and contradictory findings as they emerge to generate new research questions (Lopez et al., 2014). Yet it is unclear, given this vision of truth generation, if the current climate of mixed methods has reached this type of community ideal, Denscombe (2008) notes,

> The research paradigm comprises a conglomerate of multiple research communities rather than a monolithic entity. Within the mixed methods approach this is evident in the various sub communities that exist along the lines of different subject areas (education, health, business, etc.), different orientations (theory, practice, policy evaluation, emancipation), different research traditions (postpositivist, constructivist, historical, comparative, etc.), and as Greene (2008) indicates, different research domains. (p. 278)

Denscombe (2008) states that communities of knowledge building are flexible and have open boundaries subject to migration, given the interdisciplinary nature of mixed methods research. It is possible that a given researcher may belong to several mixed methods communities.

Monitoring the team's emotional climate. Another factor to consider is the importance of the team's climate. This means repeatedly checking the project's progress and the group's emotional temperature and recalibrating things that are not working.

One helpful method is to experience sampling group members' emotionality. Direct contact and inquiry about feelings, challenges, and so on allows team members to respond one-on-one. This may be an effective way to avoid emotional or disciplinary bottlenecks or fissures that develop between group members. This check-in process requires trust that the leader will listen and that the process of decision making is fair. As a team leader explains in one of O'Cathain et al.'s (2008) studies, "we are all busy people, and it's difficult to do more than phone and e-mail conversations, and that can you know support an existing relationship" (p. 1580).

This check-in process becomes doubly important when there are preexisting divides within the team (disciplinary, gender, race, class, etc.). The best way to deal with a team's "chilly climate" is to acknowledge the conflict without making the issue personal. Analyze the situation, encourage different points of view, focus on a solution, and move forward once a solution is reached.

To return to *ecologies of methods practices*, Dewey describes methods as both technique and embodiment of techniques. We have various visceral reactions to ways of learning of which we may not be conscious. When we confront these differences in a team, we may not respond well to these differences. A way to offset this issue is for all team members to become reflexive of their own standpoints and to check-in with themselves about their concerns. O'Cathain et al. (2008) emphasize conveying respect and equality. Group support and focus on the common goals—both negotiated by the team—prevent falling back into disciplinary inertia ("what I know is more comfortable"). Buying into difference and valuing the contributions of other perspectives and methods are critical for forging an integrated interdisciplinary mixed methods research team.

Future Directions in Interdisciplinary Team-Based Mixed Methods Research: Building Effective Teams

First and foremost, it is critical to understand that doing interdisciplinarity *is* a process that takes time and effort. Most teams need practice, because they were not trained in this environment.

Second, it takes time and funding to develop the foundational ingredients of an effective team. Research in organizational dynamics shows dynamics improve as team members become familiar, but you need to mix up teams and change members as innovation slows.

Third, consult the research in organizational dynamics and team science when challenges arise. Such research cites listening to others, asking questions, persuasive rethinking, respect, a supportive environment, leadership with autonomy, and trust as important team ingredients.

Fourth, promote open communication and a "community of practice" for reflexive scholars to negotiate conceptual meanings and research issues. On the dialogue–discussion continuum, dialogue involves the creation of ideas, tracing reason, and discovery, whereas discussion consists of taking specific action, the convergence of ideas, and arguing or debating. Establishing an iterative team-based design is critical, as there needs to be space for innovation and creativity to occur. In O'Cathain et al.'s (2008) study, an individual stated that

> I think that's been wonderful here because it's the tensions between the different things that spark ideas, and spark off thoughts, and spark off discussions. And we've had some wonderful discussions in the team, quite often related to the qualitative type, research type, field and objectives and thinking and the hard numbers and where they collide, and whether they can expand and explain each other. And as researchers that's what made it a joy, the discussions and arguments if you like that sparks out of that. It's interesting. (p. 1580)

Effective team-based researchers are sensitive and respectful of the range of differences that go beyond disciplinary diversity and honor the range of team members' contributions.

Beyond the scope of this discussion are differences that focus on cultural contexts and societal structures that can act as barriers and facilitators to the ability of team members to successfully forge an integrated, team-based project. These additional impacts can also serve to temper some of the generalizations here. What may be most unique to mixed methods interdisciplinary team-based research is the deep methodological divides that must be traversed. Although epistemic divides can exist even within a single discipline, these issues are exacerbated in interdisciplinary team-based mixed methods research projects (Hesse-Biber, 2015). Nevertheless, the aforementioned factors are important considerations for any effective team-based project.

Acknowledgments

Thanks to Bailey Flynn, Hilary Flowers, and Zainab Kiyam for their research assistance and excellent editorial advice.

Author's Note

An earlier version of this article was presented as a keynote address at the Mixed Methods International Research Association (MMIRA) Regional Conference, August 3, 2014, at the University of Texas Medical Center, San Antonio, Texas.

Declaration of Conflicting Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

References

Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*, *1*(1), 8–22. doi:10.1177/2345678906290531

Creemers, B. P. M., Kyriakides, L., & Sammons, P. (Eds.). (2010). *Methodological advances in educational effectiveness research*. London: Routledge.

Creswell, J. W., & Plano Clark, V. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.

Creswell, J. W., Shope, R., Plano Clark, V. L., & Green, D. O. (2006). How interpretive qualitative research extends mixed methods research. *Research in the Schools*, *13*(1), 1–11.

Davis, D., & Leppo, M. (2010). Qualitative plus quantitative data: A mixed methods research design. In R. P. Pelton (Ed.), *Making classroom inquiry work: Techniques for effective action research* (pp. 67–82). Lanham, MD: Rowman & Littlefield Education.

Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, *2*, 270–283. doi:10.1177/1558689808316807

Dyer, W. G., Dyer, J. H., & Dyer, W. G. (2013). *Team building: Proven strategies for improving team performance* (5th ed.). San Francisco: Jossey-Bass.

Giddings, L. S. (2006). Mixed methods research: Positivism dressed in drag? *Journal of Research in Nursing*, *11*, 195–203. doi:10.1177/1744987106064635

Greene, J. C. (2008). Is mixed methods social inquiry a distinctive methodology? *Journal of Mixed Methods Research*, *2*(1), 7–22. doi:10.1177/1558689807309969

Hesse-Biber, S. (2015). Navigating a turbulent research landscape: Working the boundaries, tensions diversity, and contradictions of multimethod and mixed methods inquiry. In S. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquiry* (pp. xxxiii–xxliii). New York: Oxford University Press.

Higonett, M. R. (1994). *Borderwork*. Ithaca, NY: Cornell University Press.

Irvine, R., Kerridge, I., McPhee, J., & Freeman, S. (2002). Interprofessionalism and ethics: Consensus or clash of cultures? *Journal of Interprofessional Care*, *16*, 199–210. doi:10.1080/13561820220146649

Klein, J. T. (1990). *Interdisciplinarity: History, theory, practice*. Detroit, MI: Wayne State University Press.

Klein, J. T., & Newell, W. H. (1997). Advancing interdisciplinary studies. In J. G. Graff & J. L. Ratcliff (Eds.), *Handbook of the undergraduate curriculum: A comprehensive guide to purposes, structures, practices, and change* (pp. 393–415). San Francisco: Jossey-Bass.

Larson, E. L., Saiman, L., Haas, J., Neumann, A., Lowy, F. D., & Fatato, B., . . . Members of the Executive Committee Expert Liaisons, Suzanne (2005). Perspectives on antimicrobial resistance: Establishing an interdisciplinary research approach. *American Journal of Infection Control*, *33*, 410–418. doi:10.1016/j.ajic.2005.05.006

Law, J., Ruppert, E., & Savage, M. (2011, March). *The double social life of methods* (Working Paper Series No. 95). Milton Keynes, UK: ESRC Centre for Research on Socio-Cultural Change.

Loeb, S., Penrod, J., Kolanowski, A., Hupcey, J., Kopenhaver Haider, K., Fick, D., . . . Yu, F. (2008). Creating cross-disciplinary research alliances to advance nursing science. *Journal of Nursing Scholarship*, *40*, 195–210. doi:10.1111/j.1547-5069.2008.00226.x

Lopez, A., Bourgois, P., Wenger, L., Lorvick, J., Martinez, A., & Krai, H. A. (2014). Interdisciplinary mixed methods research with structurally vulnerable populations: Case studies of injection drug users in San Francisco. *International Journal of Drug Policy*, *24*, 101–109. doi:10.1016/j.drugpo.2012.12.004

Lowry, I. (1992). The strength of loose concepts—Boundary concepts, federative experimental strategies and disciplinary growth: The case of immunology. *History of Science*, *30*, 371–396. doi:10.1177/007327539203000402

Luke, D. A., Carothers, B. J., Dhand, A., Bell, R. A., Moreland-Russell, S., Sarli, C. C., & Evanoff, B. A. (2015). Breaking down silos: Mapping growth of cross-disciplinary collaboration in a translational science initiative. *Clinical and Translational Science*, *8*, 143–149. doi:10.1111/cts.12248

Mason, J. (2006). Mixing methods in a qualitatively driven way. *Qualitative Research*, *6*, 9–25. doi:10.1177/1468794106058866

McNair, R. M. (2005). The case for educating health care students in professionalism as the core content of interprofessional education. *Medical Education*, *39*, 456–464. doi:10.1111/j.1365-2929.2005.02116

Mills, J. E., Gill, J., Sharp, R., & Franzway, S. (2011). Getting it together: Feminist interdisciplinary research on women and engineering. *Women's Studies International Forum*, *34*, 13–19. doi:10.1016/j.wsif.2010.09.014

Minh-ha, T. (1991). *When the moon waxes red: Representation, gender and cultural politics*. New York: Routledge.

Moody, C. C. M., & Nelson, A. J. (2013). "A towering virtue of necessity": Interdisciplinarity and the rise of computer music at Vietnam-era Stanford. *Osiris*, *28*, 254–277. doi:10.1086/671380

O'Cathain, A., Murphy, E., & Nicholl, J. (2008). Multidisciplinary, interdisciplinary, or dysfunctional? Team working in mixed-methods research. *Qualitative Health Research*, *18*, 1574–1585. doi:10.1177/1049732308325535

O'Cathain, A., Nicholl, J., & Murphy, E. (2009). Structural issues affecting mixed methods studies in health research: A qualitative study. *BMC Medical Research Methodology*, *9*(82), 4–12. doi:10.1186/1471-2288-9-82

Polanco, F., Dominguez, D., Grady, C., Stoll, P., Ramos, C., Mican, J., & Rivera-Goba, M. (2011). Conducting HIV research in racial and ethnic minority communities: Building a successful interdisciplinary research team. *Journal of the Association of Nurses in Aids Care*, *22*, 388–396. doi:10.1016/j.jana.2010.10.008

Stozak, R. (2015). Interdisciplinary and transdisciplinary multimethod and mixed methods research. In S. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquiry* (pp. 128–143). New York: Oxford University Press.

Vogel, A., Stipelman, B., Hall, K., Nebeling, L., Stokols, D., & Spruijt-Metz, D. (2014). Pioneering the transdisciplinary team science approach: Lessons learned from national cancer institute grantees. *Journal of Translational Medicine & Epidemiology*, *2*(2), 1027.

Author Biography

Sharlene Hesse-Biber, PhD, is a professor of sociology and director of the Women's and Gender Studies Program at Boston College, Chestnut Hill, Massachusetts, USA.