Strategies for Educators to Teach Mixed Methods Research: A Discussion

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Abstract

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Keywords

mixed methods, research methods, teaching, health sciences education, teaching pedagogies

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A Discussion

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Mixed methods research has become increasingly popular in multiple disciplines. Teaching mixed methods is critical to prepare students for using and evaluating the quality of published mixed methods research to inform practice. However, there is limited knowledge about instructional and pedagogical approaches to teaching mixed methods. The purpose of this paper is to outline strategies for educators on how to effectively teach mixed methods research. Teaching mixed methods requires educators to use multifaceted teaching and learning strategies targeting reflective, experiential, collaborative, and inquiry-based learning domains. Including case studies, games, and critical appraisal exercises can result in a more engaging and riveting learning experience for students. A combination of activities targeting varied teaching and learning domains, along with hands-on and student-centered teaching assignments, can be valuable to facilitate student learning of interrelated concepts of mixed methods research.

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Introduction

Mixed methods research (MMR) has become increasingly popular in the social, behavioral, and health sciences. Although the earliest texts describing the integration of quantitative and qualitative methods date back to the late 1970s, the proliferation of MMR studies in various disciplines began to accelerate significantly following the publication of the first edition of the *Handbook of Mixed Methods Research* in 2003 (Ivankova & Kawamura, 2010). Since then, the prevalence of studies based on this methodology has increased incrementally, with notable uptake in recent years, as evidenced by several methodological reviews in different disciplines (De Allegri et al., 2018; Fàbregues et al., 2022; Lee et al., 2022; Younas et al., 2019). Among other advantages, MMR allows researchers to combine the strengths of qualitative and quantitative methods, capture the multifaceted nature of complex phenomena, and generate knowledge for real-world applications (Creswell & Plano Clark, 2018; Curry & Nunez-Smith, 2015; Regnault et al., 2018).

Research methods courses are essential to all undergraduate, graduate, and doctoral-level curricula so that students can understand how scientific knowledge is generated and applied to inform decision-making (Balloo, 2019; Younas et al., 2022). However, they also pose challenges, including the generation of anxiety among students, because of their preconceived beliefs that they will underperform in these courses (Balloo, 2019; Papanastasiou,

2014). In addition, naive perceptions of research and research methods among students may hinder their ability to learn research methodology (Murtonen & Lehtinen, 2003). In the case of MMR, these challenges may be exacerbated by several unique issues. First, due to the recent history of MMR, instructors are often "first generation" MMR researchers who have not been formally trained in this methodological approach and have learned the principles and practices of the methodology on their own through hands-on experience (Earley, 2007; Guetterman et al., 2019; Hesse-Biber, 2015). In these cases, instructors may lack examples of pedagogical strategies to use in their own courses. Second, instructors may not have received adequate training in both quantitative and qualitative methods (Hesse-Biber, 2015), and therefore, may have some bias or preference for one of the approaches. Likewise, MMR courses are likely to be taught to a diverse group of students from different disciplines, most of whom will be more skilled in one of the methodologies and will also have their own particular biases regarding paradigm positions (Creswell et al., 2003). Third, owing to the broad nature of the MMR, instructors may face the challenge of integrating a large number of readings into the curriculum in a limited amount of time (Frels et al., 2012). Lastly, there is currently no consolidated body of knowledge about the most effective ways to teach MMR, as the literature in this area is still developing (Ivankova & Plano Clark, 2018; Zhou, 2023). In a comprehensive review of the literature on teaching MMR, Frels et al. (2014) identified only 20 publications, which, as the authors note, constitute a tiny fraction of the total MMR literature published thus far. In the years that followed, the literature on this topic remained rather limited, as evidenced by the absence of chapters dedicated to teaching MMR in some of the *Handbooks* on MMR published in recent years (Cameron & Golenko, 2023; Hesse-Biber & Johnson, 2015).

Most literature on MMR teaching focuses on the development and implementation of MMR courses and training retreats (Christ, 2009; Earley, 2007; Guetterman et al., 2019; Hou, 2021; Ivankova, 2010; Johnson et al., 2019; Onwuegbuzie et al., 2013; Poth, 2014). Earley (2007) and Christ (2009) detailed the steps they took in designing, instructing, and evaluating MMR courses for graduate students and included examples of course syllabi and materials. Ivankova (2010) outlined a similar process for implementing an online MMR course for graduate students, while Guetterman et al. (2019) described the evaluation process for an academic training retreat funded by the U.S. National Institutes of Health (NIH). Another body of literature has explored the development of frameworks for teaching MMR. Watkins and Gioia (2015) proposed a model for organizing MMR courses in either a sequential structure, based on teaching in the logical sequence of quantitative, qualitative, and MMR, or a convergent structure, based on organizing syllabus content within an MMR framework from the beginning of the training. Ivankova and Plano Clark (2018) proposed a social-ecological framework with a structure similar to Watkins and Gioia's (2015) convergent model to teach graduate students to navigate the various stages of the research process, considering the personal, interpersonal, and social contexts that can affect the design and conduct of any MMR study. A third group of works on this topic has focused on pedagogical approaches to teaching MMR, including the development of a model for categorizing pedagogical approaches used in MMR courses along three dimensions (i.e., approach orientation, degree of application, and degree of structure; Onwuegbuzie et al., 2013), as well as detailed descriptions of the implementation of experiential (Frias & Popovich, 2019) and active learning approaches in teaching MMR (Zhou, 2023). Finally, Frels et al. (2012) and Hesse-Biber (2015) have both explored and reflected on the challenges of teaching MMR among graduate students.

While most of the work published thus far has been either conceptual/theoretical in nature or has focused on describing a specific course or teaching experience, the proposal of concrete strategies for teaching MMR that can be integrated into a variety of course types has been scarce. In agreement with Zhou (2023), there is a need for a more comprehensive development of pedagogical knowledge regarding the effective teaching of MMR to facilitate

student learning of this complex methodology. Further development of this area of knowledge is particularly important given the current lack of full agreement on the fundamental aspects of MMR, including its definition and terminology (Fàbregues et al., 2021; Sparkes, 2015), as well as the complexity of its procedures, especially the integration of components of different nature in one or more stages of the study (Fetters & Molina-Azorin, 2017). Moreover, the provision of concrete and effective strategies for teaching MMR may be particularly important to enable researchers at the beginning of their research careers to meet the complexity of the research demands of their disciplines in an efficient manner. As shown by Onwuegbuzie et al. (2011), researchers' previous MMR training experience has a positive effect on the quality of MMR dissertation proposals.

In light of the above, the purpose of this paper is to develop strategies for educators to effectively teach MMR. The four authors are well-versed in MMR research, with both methodological publications and practical experience teaching MMR in various regions, such as Canada, the United States, Italy, and Spain, both online and in-person. The strategies described in the following sections were derived from the authors' knowledge of the literature and practical teaching experiences. Our backgrounds are in education and health, although most of our workshops and courses are attended by researchers from multiple disciplines with varying levels of experience. Therefore, the strategies detailed below should be helpful to a wide range of MMR researchers.

Strategies for Teaching Mixed Methods Research

Explore Students' Values and Beliefs about Mixed Methods Research

Prior to designing and implementing teaching and learning strategies, it is essential to investigate students' values, beliefs, and understanding of MMR. Inquiring with students about their expectations, beliefs, misconceptions, and prior knowledge of MMR enables educators to focus on their needs and expectations and revisit pedagogical approaches and strategies as students' needs evolve (Hesse-Biber, 2015). Dedicating insufficient time to assessing students' prior knowledge can adversely impact educators' capacity to deliver new knowledge and students' ability to fully comprehend and retain this knowledge (Campbell & Campbell, 2008). Assessing prior learning is an effective and supportive teaching tool for complex subjects (Hailikari et al., 2008).

MMR is complex; hence, it is valuable, but arguably not mandatory, for students to have a superior understanding of qualitative and quantitative methods. This applies, in particular, to students in undergraduate or graduate-level research methods courses. Nevertheless, any previous knowledge of research, in general, can make a meaningful difference in students' learning (Zhou, 2023). Therefore, when teaching MMR, we often ask the following open-ended questions: (a) Why are you interested in learning about MMR? (b) What is the scope of your familiarity with various research methodologies? and (c) What are the most daunting elements and fundamentals of MMR to learn? These three questions offer a means of evaluating the students' comprehension of the course or workshop content and to tailor our teaching strategies to ensure that no student is overlooked. Creating a conducive atmosphere facilitates the effective teaching and learning of intricate subjects (Billings & Halstead, 2019).

Use Published Mixed Methods Studies as Case Studies

Case studies account for an actual situation entailing challenging information that prompts individuals to apply their knowledge to overcome obstacles (Leenders et al., 2001).

Here, the concept of case study should be understood as the use of examples of MMR studies to be examined in depth for learning purposes, distinct from the concept of case study as a qualitative research approach. Case studies promote inquiry-based and active learning of complex concepts, allowing students to apply their knowledge in real-life practice (Brame, 2016). Case study as a teaching strategy prompts critical thinking and problem-solving in learners and permits them to analyze the case from multiple perspectives (Mahdi et al., 2020). Including published studies as cases in the teaching of research methods is a highly effective approach for helping students recognize problematic concepts, develop explanations for those problems, and enable educators to incorporate relevant concepts for comprehensive discussion (Younas et al., 2022). Using published peer-reviewed MMR studies as case studies can allow students to dissect the structure of an MMR study and its constituent elements (Wu & Patel, 2016). This approach also permits students to delve into the historical context of the research (Lewthwaite & Nind, 2016) and understand why and how it was carried out. A specific application of this strategy to promote case-based learning is to discuss case studies of qualitatively and quantitatively-driven MMR studies and ask students to identify the type of MMR questions present in each study and subsequently reframe those questions (Hesse-Biber, 2015).

Case studies can be employed in various manners. They can be introduced at the end of a lecture, and students may be asked to extract relevant information pertinent to the learned concept, and then generate areas for discussion and future learning (Brame, 2016). Alternatively, a lecture can commence with a case study, and each section of the case can be discussed along with relevant concepts from the course materials (Younas et al., 2022). Published studies can additionally function as research narratives, illustrating the characteristics of successful and unsuccessful research approaches (Lewthwaite & Nind, 2016). Educators employing case studies as a teaching strategy can encourage active learning by involving students in the development of case studies (Minniti et al., 2017). In keeping with this idea, while students cannot develop MMR case studies if they are in the early stages of learning about MMR, educators can divide them into groups and ask them to select a published MMR study for discussion.

Use Reflective Pedagogy to Enhance Learning

Reflective pedagogy encourages students to reflect on and think about various concepts and interconnected phenomena to enhance self-learning (Guthrie & McCracken, 2010). It instills reflective thinking in students and enables them to transform their experiences into creating meanings (Fullana et al., 2016). Reflective pedagogy can include group discussions, case studies, thinking aloud, research puzzles, and reflective writing (Lewthwaite & Nind, 2016; Younas et al., 2022). Educators may, for instance, ask students to identify critical concepts from an MMR study, reflect on how the chosen MMR design allows the authors to address their particular research objective, write accounts of their perceived and learned meanings, and subsequently outline their practical use and application in real-life research practice. Similarly, educators can make research content engaging by incorporating puzzles, problem-solving, and controversial cases to encourage students' in-depth reflective learning.

Incorporating reflective pedagogy necessitates educators to modify instruction based on students' research experience, professional backgrounds, and prior knowledge (Lewthwaite & Nind, 2016). Educators can provide students with brief reflective exercises at the end of each session and ask them to evaluate their prior learning, identify new learning areas in each session, and tailor teaching strategies to meet students' needs. This is particularly important in MMR, as Hesse-Biber (2015) highlighted that one of the challenges in the field is the prevalence of a pragmatic approach, in which researchers choose methods that appear to be the

ones that "work best," without a deeper reflection on the suitability of the chosen method to answer the research questions at hand. Within the field of MMR, Bryman (2007) contrasted the universalistic discourse, which posits that the use of MMR is inherently better in all situations, with the particularistic discourse, the notion that MMR is appropriate based on the specific research question being addressed. Reflective pedagogy can help students understand the value of the particularistic discourse in their research practice.

Teaching approaches to data integration in MMR requires an in-depth understanding of various techniques and the nature of datasets. Suppose students identify the need to understand the meaning of integration in MMR. In that case, educators can facilitate the development of mental images, analogies, and metaphors of the concept and encourage students to discuss amongst themselves before learning the integration approaches. Analogies and mental images can facilitate reflective learning (Younas et al., 2022). Analogies and metaphors such as bricolage, mosaics, maze, jigsaws, sprinkling, and stirring can be used in MMR to teach concrete and complex integrative reasoning and integration procedures (Bazeley & Kemp, 2012; Younas et al., 2022). For example, in mosaics and jigsaw puzzles, each piece is critical to completing the puzzle, contributing to its meaningful integration (Bazeley & Kemp, 2012). When using reflexive pedagogy to teach MMR, educators should also encourage students to maintain reflective logs of their MMR learning experiences, issues, and concerns and to seek guidance on these matters (Hesse-Biber, 2015; Nind & Katramadou, 2022).

Use Visuals to Enhance Integrative Learning

Visual aids are effective tools for teaching complex concepts and engaging students in the course content (Shabiralyani et al., 2015). Educators can use visuals to illustrate complex processes and systems, enhancing their students' analytical and logical thinking (Raiyn, 2016). Visuals can play a significant role in the instruction of research methods, allowing students with varied learning styles to comprehend intricate research concepts more effectively (Younas et al., 2022). In MMR, visuals are commonly used during the conceptualization and operationalization of the study design and during data analysis, integration, interpretation, and illustration of the integrated findings. MMR procedural diagrams are used to illustrate the step-by-step process of an MMR study (Creswell & Plano Clark, 2018), and joint displays in the form of tables, figures, graphs, and maps are used to illustrate data integration (Guetterman et al., 2021; Younas et al., 2021). Additionally, visuals are often incorporated at different stages of an MMR study to clarify the linkages between the qualitative and quantitative datasets, and to generate inferences and meta-inferences (Bazeley, 2018; Younas et al., 2021).

Given the prevalence of visuals in MMR, educators teaching the methodology can incorporate visual aids during the discussion, hands-on practice, and the instruction of complex concepts. Educators may ask students to review the consistency of procedural diagrams and joint displays describing study methods and integrated data in the narrative. Educators can ask students to work in groups and recreate procedural diagrams, joint displays, and other graphics and visuals presented in published case studies to add more creativity. Educators can also encourage students to bring examples of excellent visuals from published MMR studies to enhance their active participation in learning and promote inquiry-based learning (Younas et al., 2022). Using visuals can promote reflective and integrative thinking by allowing students to understand the complexity of MMR and the interrelationships among the various components of an MMR study.
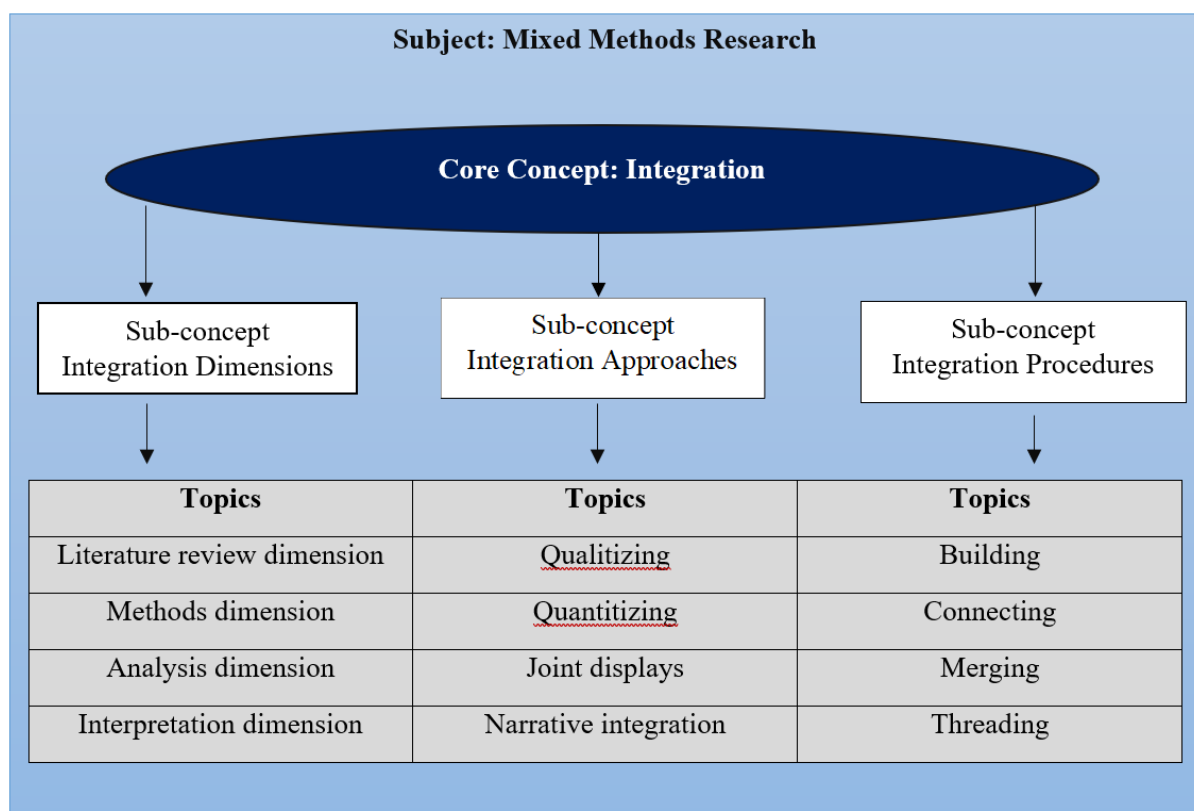
Use a Concept-Based Teaching Approach

Concept-based teaching is a three-dimensional teaching framework that includes factual content about disciplinary and universal concepts, skills associated with the concepts, and practical applications and generalizations of concepts (Erickson et al., 2017). This approach enables and prepares students to connect their learning with prior experiences. It engages them in a deeper understanding of core concepts and content, and integrates action with their theoretical and conceptual learning (Erickson et al., 2017; Marschall & French, 2018).

MMR is a concept-laden research methodology incorporating complex and interrelated concepts from qualitative and quantitative research and its foundational and advanced concepts (Meixner & Hathcoat, 2019). Therefore, teaching MMR with a concept-based approach can be highly beneficial for students who wish to move beyond theoretical learning into more experiential and inquiry-based learning, while also developing the skills of an MMR researcher. Integration is, for instance, one of the core concepts in MMR (Bazeley, 2018; Creswell & Plano Clark, 2018), and it can be subdivided into various sub-concepts and critical topics for discussion (see Figure 1 as an example of concept-based teaching of integration in MMR). Educators can also use the other tips in this paper to teach these concepts.

Figure 1

Concept-based Teaching of Integration in MMR

Subject: Mixed Methods Research
Core Concept: Integration

Sub-concept Integration Dimensions	Sub-concept Integration Approaches	Sub-concept Integration Procedures

Topics	Topics	Topics
Literature review dimension	Qualitizing	Building
Methods dimension	Quantitizing	Connecting
Analysis dimension	Joint displays	Merging
Interpretation dimension	Narrative integration	Threading

Use Class Tutorials for Practicing Mixed Methods Skills

Tutorials are small groups of individual sessions, often held after a lecture, that allow students to engage with the instructor and peers to put newly learned concepts into practice (Singh, 2020). These sessions can be supervised, grouped, and practical to assist students in

learning cognitive and logical skills, while applying new concepts in various courses (Kumar et al., 2016; Lloyd & Robertson, 2012; Singh, 2020). Tutorials have been found to be highly beneficial for improving student performance, promoting higher-level and critical thinking skills, and fostering a collaborative learning environment (Feld et al., 2020; Ferris, 2015). This strategy is often used in statistics and quantitative research to help students develop their research skills and competencies via guided and individual practice sessions (Bliwise, 2005; Lloyd & Robertson, 2012; Willie et al., 2012). The use of tutorials as a teaching and learning strategy in MMR is a promising approach, as it enables students to immediately apply the skills and concepts learned in a lecture to real-life situations (Wagner et al., 2011). Tutorials are frequently centered on a single concept or problem (Edmunds & Brown, 2010), and they aid students in developing an in-depth practical understanding of the concept (Singh, 2020). Therefore, as discussed earlier, combining tutorials with a concept-based teaching approach to MMR can be valuable for students to develop more hands-on and problem-based learning of complex MMR concepts. In such instances, educators can teach various dimensions of integration such as literature review, methods, analysis, and interpretation. For example, if a session is focused on integration in the literature review dimension, educators can assign students to write a short literature review for an MMR research project that integrates qualitative and quantitative literature, while highlighting gaps. Tutorials can effectively teach various concepts in MMR, such as data analysis, joint displays, data transformation, and inference development. Educators can use tutorials creatively to offer blended learning to students for them to grasp the meaning of theoretically complex topics as well as an applied understanding of their application in MMR.

Incorporate Software into Teaching and Learning

Software has been widely used for data storage and handling in both quantitative and qualitative research. Much notable software is SPSS, R, NVIVO, and Dedoose. Teaching students how to use data analysis software is essential in research methods courses. Learning to use software of this type prompts students' active engagement in research and helps them understand the role of researchers in data control, analysis, and interpretation (Nind & Katramadou, 2022). In MMR, the software can be used for analysis in both the qualitative and quantitative phases. Educators need to provide opportunities for students to use the software. One method is to use real datasets during tutorials for practising data analysis using MMR analysis software such as MAXQDA.

Learning how to integrate qualitative and quantitative data using software can help students become more engaged and motivate them to use advanced technologies in research. Educators can provide students with qualitative codes and ask them to develop quantitative matrices or vice versa to practice data transformation in software (Bazeley, 2003). They can also teach students to use MAXQDA and other software to develop joint displays, visuals, models, and frameworks illustrating mixed analysis (Guetterman et al., 2015). Incorporating software into teaching is consistent with learning by doing (Aguado, 2009; Bazeley, 2003). To promote collaborative and experiential learning, educators could organize MMR capstone group projects on software use (Rose & Low-Choy, 2019).

Include Games and Fun Activities Methodology during Lectures

Acquiring the skills and training required to become an MMR researcher can be challenging due to the complexity of the concepts used in MMR (Younas & Durante, 2022). For students, learning about the intricate aspects of MMR can become tedious and redundant. One way of addressing this challenge is through the use of game-based teaching to make the

content more engaging for students. Game-based learning in such a context is beneficial because it increases student engagement by offering active, student-centered, problem-based, interactive, and socially mediated teaching activities (Boyle et al., 2014; Zeng et al., 2020). MMR can be taught using several online and in-class games and activities, such as jigsaw puzzles, Minecraft, paintings, scavenger hunts, and storytelling. Paintings and storytelling, for instance, can enable students to develop qualitative narratives in MMR. Minecraft is a valuable educational tool to teach complex content in an appealing manner (Checa-Romero & Pascual Gómez, 2018; Ellison & Evans, 2016). This game allows individuals to create their simulated worlds using a digital sandbox (Ellison & Evans, 2016; Minecraft, 2022). In an MMR project, creating simulated worlds can be a metaphor for generating inferences from qualitative and quantitative phases and meta-inferences from integrating distinct findings.

Develop Step-by-Step Instructional Tools for Teaching Data Analysis and Integration

Data analysis and integration are among the most crucial, yet daunting, and time-consuming tasks in MMR (Bazeley, 2018). Learning about tiny details of data analysis and integration can be tedious and challenging for students with varying levels of MMR knowledge. Educators should make an effort to develop step-by-step guides and tools to help students understand the complexities of analysis and integration. Decision trees, for example, can be helpful educational tools for understanding integration procedures and relevant joint displays in accordance with the nature of MMR design and researchers' intent (Younas & Durante, 2022).

Give Real Datasets for Collaborative Practice

In most cases, complex research method concepts and courses can be tedious to understand and apply without the use of real-world datasets (Younas et al., 2022). Consequently, it is essential for educators to incorporate engaging, tangible tasks into their teaching in order to facilitate students' critical learning of these complex concepts. Using actual datasets can be an excellent way of facilitating students in learning about the details and intricacies of data handling, analysis, and interpretation in MMR (Lewthwaite & Nind, 2016). Working with real datasets enhances students' interest in course content, practical learning, motivation to engage in research, and understanding of unique challenges and relevant solutions to real-life research challenges (Neumann et al., 2013).

MMR involves a research team with a wide range of expertise. Working with qualitative and quantitative data and their integration can be intimidating for students in the early stages of MMR learning. Therefore, providing real datasets for group learning, practice, and discussion is an excellent way to engage students in collaborative work such as that required for MMR projects. Students may also have different interests and strengths; hence, collaborative work can enable them to learn from each other. Collaborative learning can allow students to complete challenging tasks proactively and enable them to engage in formative assessments of their evolving MMR skills and competencies (Zhou, 2022). By working together with educators and peers, students can integrate their perspectives and gain a comprehensive understanding of research concepts and their practical applications (Wu & Patel, 2016). The educational literature emphasizes the significance of employing collaborative teaching strategies for MMR, such as engaging in discussions and hands-on work with datasets (Wagner et al., 2011).

Bring Guest Lecturers with a Wide Range of Research Expertise

Educators should invite guest speakers with various levels of MMR expertise to share their experiences learning, operationalizing, and conducting MMR research. Not all research projects can be completed due to methodological challenges, feasibility issues, and emergent requirements to tailor the methods and approaches. This is particularly pertinent in MMR due to the emergent nature of this type of design. Therefore, inviting guests to discuss their personal experiences of tailoring and modifying their research plans, issues in operationalizing study methods, analyzing and integrating data, and challenges in capturing the nuances of the studied phenomena can provide students with a real-life account of MMR practices (Pfeffer & Rogalin, 2012). Choosing a range of experts with MMR expertise in various subjects can be instrumental in enabling students to learn about cross-cultural and cross-disciplinary issues, methods, and approaches to MMR (Hesse-Biber, 2015; Pfeffer & Rogalin, 2012).

Incorporate Critical Appraisal of Student Chosen Mixed Methods Article

Critical appraisal of the research literature is an essential skill for students as it enables them to distinguish between high-quality and low-quality research (Inam, 2007). Learning how to appraise research evidence critically is instrumental to ensuring that the highest quality of evidence is used to inform practice (Laidlaw et al., 2012). Therefore, educators should incorporate the critical appraisal of MMR articles as a key competency of their courses. The student-selected MMR articles can potentially engage students and pique their interest in critical appraisal. Learning about critical appraisal can allow students to learn about the minute intricacies of MMR designs, methods, integration, and interpretation procedures. Educators can encourage students to complete critique papers examining various MMR perspectives in the course content, such as definitions of mixed and multi-method research and the application of design and integration principles in published studies (Ivankova & Plano Clark, 2018). Checklists and guidelines published in the literature for both appraising the MMR methodological (Hong et al., 2018) and reporting quality (O'Cathain et al., 2008) could be used for this purpose.

Conclusions

Teaching MMR requires educators to focus on improving students' in-depth learning and repertoire of integrating methods. Educators should use multifaceted teaching and learning strategies targeting reflective, experiential, collaborative, and inquiry-based learning domains. A blend of teaching and learning domains coupled with hands-on and student-centered teaching activities can be valuable in facilitating student learning of the interrelated and linked concepts of MMR. The proposed strategies can be useful for educators interested in teaching MMR through engaged and intriguing approaches.

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