

Graduate Students' Perspectives on Applying Mixed Research Fundamentals to Data Collection and Peer Feedback

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ABSTRACT

This study explored graduate students' perspectives on applying the fundamentals of mixed methods research (MMR) during data collection and examined how peer feedback shaped these perspectives. We used archival data collected between 2020 and 2025 from an online doctoral research foundation class, and we analyzed participants' responses using thematic analysis. Three major themes emerged: comprehensive understanding through data integration, strengthening research evidence and methodological compatibility, and collaborative learning through peer feedback. Findings indicated that students view MMR as a valuable approach for integrating quantitative and qualitative data, deepening the depth and validity of research findings, and enabling richer interpretations of research problems. Peer feedback was identified as a critical factor in promoting collaborative learning, refining research designs, and increasing confidence in applying mixed methods principles. Future research could incorporate observational or performance-based assessments to complement self-reported perspectives and provide a more comprehensive view of how graduate students operationalize MMR principles in practice.

KEYWORDS: Mixed methods research, data integration, graduate students, peer feedback, pragmatism, thematic analysis

Mixed-methods research (MMR) has emerged as a key approach for addressing complex research problems by integrating quantitative and qualitative data (Creswell & Plano Clark, 2018). Rather than privileging a single methodological tradition, MMR lets researchers draw on the strengths of both numerical measurement and contextual interpretation to provide a more comprehensive understanding of phenomena (Fetters et al., 2013). This integration is particularly valuable in the data collection phase, where decisions about what information to collect and how to collect it directly influence the depth and validity of research outcomes (Schoonenboom & Johnson, 2017). Despite its growing use, empirical research remains limited on how graduate

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students perceive and apply mixed-methods fundamentals in practice, particularly during data collection.

Much of the mixed-methods literature focuses on design typologies, philosophical foundations, and analytic strategies (Hesse-Biber, 2015; Plano-Clarke et al., 2014), leaving the practical challenges and pedagogical experiences of emerging researchers underexamined. Although some studies have addressed faculty perspectives on MMR and instructional strategies for teaching research methodology (Kroll, 2021; Leech & Onwuegbuzie, 2020), there is a paucity of research on students' experiential perspectives, particularly regarding how they negotiate mixed-methods principles during data collection. Given that data collection is foundational to the research process and often where methodological integration must be operationalized, this gap has implications for how graduate students are trained to conduct rigorous, integrated research.

Beyond methodological complexities, peer feedback in supporting students' methodological learning has received increasing attention in higher education research (Liu & Carless, 2020; Nicol, 2021). Peer feedback facilitates collaborative learning, improves critical thinking, and enhances confidence (Topping, 2020). However, its specific influence on students' understanding and application of MMR principles has not been empirically investigated. Exploring peer feedback in the context of mixed-methods instruction can yield new insights into how students integrate theoretical knowledge with practical research decisions (Awuonda et al., 2025).

The present study is grounded in the philosophical paradigm of pragmatism, which underpins the mixed-methods approach (Morgan, 2014). Pragmatism emphasizes practical problem-solving, flexibility in method selection, and research strategies that best address the research question rather than adherence to a single methodological orthodoxy (Biesta et al., 2017). Pragmatism offers a prism through which methodological decisions, such as choosing and combining data gathering techniques, can be seen as context-bound, purpose-driven choices rather than abstract theoretical preferences for graduate students' attainment of applied research skills.

Despite the acknowledged value of pragmatism in mixed-methods scholarship, little is known about how graduate students internalize pragmatic reasoning and apply it to real research tasks, such as selecting and integrating data collection methods. Furthermore, the interplay between students' pragmatic reasoning and peer-based learning dynamics represents an important but understudied dimension of research methodology education. Therefore, this study aims to explore graduate students' perspectives on applying MMR fundamentals to data collection and to examine the role of peer feedback in shaping those perspectives.

Background

Mixed-methods research (MMR) has gained prominence across the social sciences because it integrates quantitative and qualitative approaches and provides a more comprehensive understanding of complex educational and human phenomena (Creswell & Plano Clark, 2022; Johnson et al., 2020). As the use of MMR continues to expand, researchers and graduate students must develop a clear understanding of how mixed-methods principles are translated into practical research decisions, particularly during data collection, where the integration of qualitative and quantitative approaches begins to shape the overall coherence and rigor of a study (Creswell & Plano Clark, 2022). Effective data collection in MMR requires careful alignment among research questions, sampling, data sources, sequencing, and integration strategies, as weaknesses in these areas can compromise the validity and interpretive potential of subsequent analyses (Guetterman et al., 2022; Plano Clark & Ivankova, 2022). Graduate students, in particular, may struggle to move

from conceptual understandings of MMR to the practical application of its fundamentals in authentic research contexts, highlighting the importance of pedagogical approaches that encourage reflection, application, and collaborative learning. Peer feedback may provide an additional mechanism through which students critically evaluate their methodological decisions, identify gaps in their understanding, and refine their approaches to mixed-methods data collection (Boud & Molloy, 2020; Nicol et al., 2022). Therefore, this qualitative, reflective, open-ended response study explores graduate students' perspectives on applying mixed-methods research fundamentals to data collection and examines the role of peer feedback in shaping those perspectives within a Foundations of Educational Research course. The study is guided by the following research questions:

RQ1: How do graduate students perceive the application of MMR fundamentals to data collection methods?

RQ2: What role does peer feedback play in shaping graduate students' perspectives on applying MMR fundamentals to data collection?

Theoretical Framework

This study is grounded in the pragmatic paradigm, which serves as the theoretical foundation for understanding graduate students' perspectives on applying the fundamentals of Mixed Methods Research (MMR) and on the role of peer feedback in learning. Pragmatism, as a philosophical approach, emphasizes practical solutions to research problems, focusing on methods and strategies that best address the research question rather than strictly adhering to a single methodological tradition (Creswell & Plano Clark, 2018). Pragmatism is particularly suited to mixed-methods research because it lets researchers integrate quantitative and qualitative approaches, capitalizing on each strength while addressing its limitations.

Pragmatism and Mixed Methods Research

In the context of MMR, pragmatism provides the philosophical justification for combining data types. Unlike paradigms that prioritize either objective measurement (positivism) or subjective understanding (constructivism), pragmatism prioritizes the research question as the central determinant of method selection (Morgan, 2014). This aligns with the study's focus on graduate students' application of MMR principles: students are expected to understand when and how to integrate quantitative and qualitative data to develop comprehensive insights into complex research problems.

Pragmatism also emphasizes practical outcomes and actionable knowledge. In this study, graduate students' reflections on data collection and peer feedback demonstrate a pragmatic orientation: they recognize the value of using multiple methods to produce more credible and interpretable results. By prioritizing what works in practice, students learn to balance methodological rigor with contextual understanding, reflecting the central tenets of the pragmatic approach.

Traditional research approaches have often emphasized a single methodological tradition, with researchers relying primarily on either quantitative or qualitative methods to address a particular research problem. Although single-method approaches can provide valuable and focused evidence, they may be limited when a research problem requires both the breadth of quantitative evidence and the depth of qualitative understanding. Mixed-methods research (MMR), in contrast,

intentionally brings quantitative and qualitative approaches together within a single study to generate complementary perspectives and a more comprehensive understanding of complex phenomena (Kajamaa et al., 2020; Matović & Ovesni, 2023). Importantly, MMR differs from simply using multiple methods because it purposefully integrates qualitative and quantitative components throughout the research process (Guetterman et al., 2020; Matović & Ovesni, 2023). This distinction makes applying MMR fundamentals particularly important for graduate students, who must move beyond understanding individual qualitative and quantitative techniques to recognizing how methodological decisions, including data collection, can contribute to integration across a study. Research indicates that integration remains one of the more challenging aspects of MMR and requires deliberate planning across research questions, design, data collection, analysis, and interpretation (Guetterman et al., 2020; Matović & Ovesni, 2023). Within this context, the present study moves beyond examining students' understanding of research methods as isolated quantitative or qualitative procedures and instead explores how graduate students perceive the application of MMR fundamentals specifically to data collection. Furthermore, by examining students' reflective responses and the role of peer feedback, the study provides an opportunity to understand how collaborative engagement may shape students' developing capacity to apply MMR principles in practice. This focus is particularly relevant because graduate research-methods education has increasingly recognized the value of experiential and collaborative approaches that allow students to engage with the practical complexities of conducting MMR rather than learning methodological concepts solely in the abstract (Pasipamire, 2020; Solansky & Fry, 2022).

Integration of Peer Feedback in a Pragmatic Framework

As a collaborative learning mechanism, peer feedback aligns with pragmatism by emphasizing problem-solving, experiential learning, and iterative refinement of research processes. Within a pragmatic framework, peer feedback is not merely a social activity but a practical tool for enhancing methodological competence. Through discussion, critique, and shared reflection, students refine their data collection strategies, validate their decisions, and build confidence in applying mixed-methods principles. This process exemplifies a pragmatic approach to learning, in which knowledge is generated through action, reflection, and practical application rather than through purely theoretical instruction (Patton, 2015). By situating the study within a pragmatic theoretical framework, this research examines two interconnected phenomena:

- 1) The application of mixed-methods research fundamentals to the data collection emphasizes how students combine qualitative and quantitative approaches to generate meaningful insights.
- 2) The role of peer feedback in shaping understanding and methodological competence, emphasizing the practical, collaborative processes through which students learn to apply mixed-methods principles effectively.

This pragmatic framework supports the study's qualitative design by emphasizing practical consequences, experiential understanding, and the relationship between knowing and acting rather than privileging an abstract notion of universal “truth” or a purely subjective interpretation of reality (Kelly & Cordeiro, 2020). Pragmatism views inquiry as an experiential, problem-oriented process in which knowledge is evaluated by its usefulness in understanding and responding to real-world situations (Gillespie et al., 2024; Liu, 2022). This orientation is particularly relevant to the present study because it focuses not simply on whether graduate students can recall MMR concepts, but on how they understand and apply MMR fundamentals to the practical task of data collection,

and how peer feedback may influence that understanding. From a pragmatic perspective, students' reflections, methodological reasoning, and interactions with peers are meaningful sources of knowledge because they show how methodological ideas are interpreted, tested, reconsidered, and applied in an authentic educational context (Kelly & Cordeiro, 2020). Accordingly, the pragmatic framework provides a lens for interpreting the findings by examining how graduate students draw on their experiences and collaborative learning to make practical methodological decisions and develop an understanding of MMR in applied research contexts. This emphasis aligns with the broader role of pragmatism in mixed-methods research, where methodological choices are guided by the research problem and the potential contribution of different forms of knowledge rather than rigid adherence to a single philosophical or methodological tradition (Gillespie et al., 2024; Liu, 2022).

Empirical Review of Literature

Mixed methods research has become increasingly prominent across disciplines because it integrates quantitative and qualitative data, offering richer insights than single-method designs (Creswell & Plano Clark, 2018). The advantages of MMR, such as enhanced validity, triangulation, and a more comprehensive understanding of complex phenomena, are well documented (Fetters, Curry, & Creswell, 2013; Hesse-Biber, 2015). Recent scholarship emphasizes not only methodological integration but also the importance of teaching and learning mixed methods principles, particularly at the graduate level, where methodological literacy influences research quality (Leech & Onwuegbuzie, 2020).

Despite this growth in MMR practice and instruction, existing literature reveals several significant gaps. First, although researchers have examined faculty and student perceptions of mixed methods broadly (Gelling, 2020; O'Cathain, 2018), limited empirical work specifically explores graduate students' perspectives on applying mixed-methods fundamentals to the data-collection phase. Most educational research on MMR focuses on design selection or data analysis strategies, leaving data collection processes underexamined in the context of student learning (Hanson, Creswell, Clark, Petska, & Creswell, 2005; Plano Clark, Huddleston, & Estabrook, 2014). This gap is significant because data collection decisions fundamentally shape the integration process and, ultimately, the validity of a mixed-methods study (Schoonenboom & Johnson, 2017).

Existing studies often concentrate on faculty experiences or curricular recommendations rather than student experiences (Kroll, 2021). While it is recognized that graduate students face challenges with mixed methods instruction, including conceptual understanding, methodological translation, and practical application (Onwuegbuzie & Teddlie, 2021), few studies provide detailed accounts of students' subjective perspectives on applying MMR principles, especially in real learning environments such as online courses.

The literature on mixed methods research emphasizes that data collection is not a neutral or purely technical step but a deeply integrative phase in which methodological decisions shape the quality of meta-inferences (Fetters et al., 2013; Tashakkori & Teddlie, 2010). Scholars emphasize that timing, prioritization, and sequencing of qualitative and quantitative strands must be intentionally aligned to achieve meaningful integration (Creswell & Plano Clark, 2018). However, empirical studies continue to show that novice researchers, particularly graduate students, often struggle to operationalize these design features during actual data collection, frequently treating methods as parallel rather than interconnected processes (Ivankova, 2015; Schoonenboom & Johnson, 2017). This disconnect suggests a need for greater instructional

emphasis on the procedural mechanics of integration during data collection, rather than on design selection or final analysis.

The expansion of online and hybrid graduate education has further complicated the development and assessment of mixed-methods competencies. While digital learning environments provide increased access and flexibility, research indicates that they may also limit opportunities for hands-on methodological practice and immediate instructor feedback, both of which are critical for mastering complex research designs (Trust & Whalen, 2020; Kebritchi et al., 2017). In mixed-methods instruction, online platforms can make it harder for students to fully engage in iterative data-collection planning, collaborative design refinement, and real-time integration discussions (Archibald et al., 2019). As a result, there is a growing need to examine how online learning environments influence graduate students' ability to internalize and apply mixed-methods principles, particularly during the data-collection phase, when methodological decisions are most consequential.

While peer feedback has been identified as a beneficial pedagogical practice in qualitative and quantitative research instruction (Liu & Carless, 2020; Nicol, 2021), its role in supporting the acquisition of mixed methods competencies remains underexplored. Studies show that peer interaction can improve critical thinking and methodological confidence (Topping, 2020). However, evidence remains limited on how collaborative peer feedback specifically influences graduate students' ability to integrate mixed-methods fundamentals into research design and data collection.

Although pragmatism is acknowledged as the philosophical foundation of MMR (Biesta et al., 2017; Morgan, 2014), empirical studies linking students' pragmatic reasoning to their methodological choices in applied research contexts remain limited. In other words, it remains unclear how students apply pragmatic logic when deciding on mixed-methods data collection and integration in practice. Theoretical perspectives on mixed methods research suggest that pragmatism provides the philosophical justification for integrating qualitative and quantitative approaches based on the research problem rather than methodological purity (Johnson & Onwuegbuzie, 2004; Morgan, 2014).

Pragmatism emphasizes practical consequences and contextual decision-making, positioning researchers to select methods that best address specific inquiry needs. However, empirical research rarely examines how graduate students interpret and apply pragmatic reasoning in making methodological decisions. Similarly, experiential learning theory suggests that methodological competence develops through reflection on practice-based experiences (Kolb, 1984), yet few studies examine how such reflective processes unfold in mixed-methods training. This gap highlights the need to better understand how students translate abstract philosophical assumptions into concrete data-collection strategies in authentic research contexts.

Methodology

This study employed a qualitative research method to analyze archival data consisting of written responses to a discussion prompt, collected over 5 years, from doctoral students enrolled in a fundamental research methods class. The study used a reflective, open-ended response approach (Ortlipp, 2008; Mortari, 2015) to explore graduate students' perspectives on applying the fundamentals of mixed methods research during data collection and to understand their perceptions of peer feedback's role in shaping those perspectives. A qualitative approach was appropriate

because the study aims to capture doctoral students' personal opinions, meanings, interpretations, and experiences regarding applying the fundamentals of mixed methods research in data collection.

Participants and Context

Participants were doctoral students enrolled in a graduate research course focused on advanced research methods at a higher education institution in the Southwest United States. The data was collected between 2020 and 2025 as part of the doctoral research course assignment. Although it was a graded, required task, students were encouraged to share their thoughts freely and to openly reflect on and comment on their peers' posts. Because this assignment was informal and hosted on an online discussion forum, we did not judge content, and participants received full credit as long as they remained actively engaged. The study initially collected 250 responses. Using purposive sampling, the researchers intentionally selected written samples that demonstrated thorough, well-elaborated reflections in response to the prompt. This process resulted in a final sample of 122 responses. Inclusion criteria focused on the depth and richness of the written reflections, the presence of substantive peer responses, and evidence of active engagement with mixed methods research concepts. Responses that were brief, underdeveloped, or lacked peer interaction were excluded from analysis. We collected the data through a structured reflection assignment embedded in a graduate course activity. To protect participant confidentiality, we removed all identifying information before analysis. Participants were enrolled in the College of Education and represented the following academic departments: Educational Psychology (47%), Counselor Education (23%), Instructional Technology (7%), Curriculum and Instruction (15%), and Higher Education (8%). The sample included 56% female and 44% male participants and spanned a range of age groups. All participants shared the same core graduate research course, taught by the same professor, and received consistent foundational instruction in research methods. Completion of this course was required for all participants within their graduate programs

Data Collection

Data were collected through a written reflection prompt administered during the course. Students were asked to respond to the following two-part question:

- 1) How do you apply the fundamentals of mixed methods research during the data collection process?
- 2) How do you perceive the role of peer feedback in shaping your understanding and application of these fundamentals?

Participants submitted their responses electronically using the course platform. Participants were instructed to share their thoughts openly and provide detailed responses to both parts of the prompt to receive full participation credit. The reflections varied in length and depth, providing rich, text-based data suitable for qualitative analysis. Responses collected electronically each semester were automatically saved in the Learning Management System (Blackboard/Canvas), creating the archival database used in this study.

Data Analysis Procedure

The data were analyzed using an inductive thematic analysis approach (Clarke & Braun, 2017; Proudfoot, 2023). This approach was selected for its flexibility and its emphasis on

identifying patterns of meaning grounded in participants' own experiences rather than pre-existing theoretical frameworks. The qualitative software QDA Miner was employed to manage, code, and analyze textual data within an inductive thematic analysis framework. The analysis followed Braun and Clarke's six-phase process.

1. ***Familiarization with the Data.*** In this first phase, the researchers repeatedly read all students' responses to develop an in-depth understanding of the dataset, noting initial observations and potential patterns. After this initial phase, the inclusion and exclusion criteria were discussed, resulting in the exclusion of all responses that lacked depth or consistency or that contained missing peer responses. Also, due to the large number of entries, the team decided to purposefully select about 10 responses from each semester the course was offered.
2. ***Generating Initial Codes.*** Data was coded inductively, with attention to meaningful units of text related to students' conceptualizations of mixed-methods data collection and the influence of peer feedback on their perceptions. Coding remained data-driven rather than theory-driven (Perkins & Roe, 2024).
3. ***Searching for Themes.*** Individually, then collectively, codes were examined for patterns and grouped into broader categories representing shared meanings across the selected sample of participants' reflection posts.
4. ***Reviewing Themes.*** Emerging themes were reviewed against the dataset to ensure coherence, internal consistency, and distinctiveness, thereby avoiding redundancy. Some themes were collapsed, refined, or discarded during this phase.
5. ***Defining and Naming Themes.*** Each theme was clearly defined, capturing the essence of doctoral students' perspectives. Themes were named to reflect both conceptual clarity and alignment with the research questions.
6. ***Producing the Report.*** Final themes were organized into a coherent narrative, supported by representative excerpts from participants' reflections to illustrate key findings. According to Perkins & Roe (2024), the inductive process allows themes to emerge organically from the data, providing insight into participants' original responses. Therefore, students' responses were carefully cross-checked to ensure transparency in how they reported their methodological knowledge and preferences, and in how they socially constructed their understanding through peer interaction.

Trustworthiness

To ensure rigor, the study established qualitative criteria of credibility through iterative engagement with the data and careful theme development following a coding framework (see Table 1). The study also supported dependability by maintaining a transparent archival record and documenting coding and analytic decisions. Confirmability was established by grounding interpretations in participants' words through illustrative excerpts taken directly from their recoded responses. The researchers also engaged in reflexivity by acknowledging the researcher's dual role as instructor and analyst and critically examining potential biases. To control for instructor bias, the other two research teams primarily conducted data analysis, with the third member (instructor) serving only as an expert reviewer of emerging themes.

Ethical Considerations

Participation was required primarily for the graded class assignment. At the time of data collection, students were not informed that their reflections would be used for research purposes. Once the data became archival, we submitted an IRB proposal requesting permission to use the data for research purposes. After review, the IRB granted permission to use the anonymized data for analysis to ensure confidentiality. The study adhered to institutional ethical guidelines for research involving human participants. We protected all identifiable information, including students' names and IDs. We used only their gender and area of study as the two demographic variables.

Results

We analyzed responses from graduate students in an online class using inductive thematic analysis to identify recurring patterns in applying mixed-methods research fundamentals during data collection and the role of peer feedback in shaping students' perspectives. The analysis generated several themes reflecting students' perceptions of the benefits of integrating quantitative and qualitative data, as well as the influence of peer interaction on the development of methodological understanding.

For the first part of the discussion prompt, asking the following research question: "How do graduate students perceive the application of MMR fundamentals to data collection methods?" Two themes are presented separately:

- a) comprehensive understanding through data integration
- b) strengthening research evidence and methodological compatibility

For the second part of the prompt asking the following research Question: "What role does peer feedback play in shaping graduate students' perspectives on applying MMR fundamentals to data collection?", the findings are presented independently under the theme collaborative learning through peer feedback.

Table 1
Coding Framework

Codes	Categories	Themes
Integration of qualitative and quantitative data	Data integration	Comprehensive understanding through mixed methods
Richer interpretation of findings	Multiple perspectives	Comprehensive understanding through mixed methods
Combining the strengths of methods	Complementarity	Strengthening research evidence
Validation of findings	Triangulation	Strengthening research evidence
Pragmatism in research design	Philosophical foundations	Methodological compatibility

Table 1

Continued

Compatibility of paradigms	Mixed paradigm integration	Methodological compatibility
Intermethod and Intramethod mixing	Data collection strategies	Methodological integration
Peer discussion	Collaborative learning	Role of peer feedback
Feedback on research design	Skill development	Role of peer feedback
Confidence in using MMR	Learning reinforcement	Role of peer feedback

Research Question 1: How do graduate students perceive the application of MMR fundamentals to data collection methods?

Analysis of the reflective responses revealed that students applied MMR fundamentals by integrating multiple data sources to achieve a more comprehensive understanding of research problems and by recognizing the importance of methodological compatibility in strengthening research evidence. Participants demonstrated an understanding of how qualitative and quantitative approaches complement one another during data collection. Two major themes emerged from the data:

Theme 1: Comprehensive Understanding Through Data Integration

A dominant theme that emerged from the analysis was that mixed-methods research enables researchers to develop a more comprehensive understanding of research problems by integrating quantitative and qualitative data. Participants frequently emphasized that combining these two data sources yields richer, more meaningful insights than relying on a single methodological approach. One participant explained that "mixed methods study enables us to comprehensively understand data because it combines numerical results with participants' explanations" (Participant 3). Similarly, another participant noted that "the integration of quantitative and qualitative data provides a richer and more comprehensive understanding of the research topic" (Participant 7). These responses suggest that students view data integration as an important strategy for deepening and broadening research findings.

Several participants further emphasized that mixed-methods research enables researchers to capture both measurable patterns and contextual experiences. For instance, one student stated, "Quantitative data shows patterns, while qualitative data explains why those patterns exist" (Participant 9). Another participant explained that "mixed methods allow researchers to see both the statistical trends and the human experiences behind the numbers" (Participant 12). These responses highlight students' recognition that quantitative findings alone may not fully explain complex research phenomena without the additional context provided by qualitative insights.

Other participants expressed similar views on the complementary roles of both data types. One participant stated, "Combining qualitative and quantitative approaches helps researchers see the full picture of the research problem" (Participant 15). Another student explained that "mixed methods provide deeper insight because numbers alone cannot explain complex issues" (Participant 18). Likewise, another participant noted that "qualitative data helps interpret quantitative results and makes the findings more meaningful" (Participant 20). Additional participants emphasized that "the integration of both methods provides multiple perspectives on the same issue" (Participant 22).

and that "mixed methods help us understand the context behind statistical findings" (Participant 24).

Students also highlighted that integrating different data types enables researchers to explore research questions more thoroughly. For example, one participant stated, "Using both types of data allows researchers to explore research questions more thoroughly" (Participant 26). At the same time, another noted that "mixed methods produce richer data because they combine measurement and explanation" (Participant 29). Similarly, another participant explained that "qualitative and quantitative findings together provide a holistic view of the phenomenon" (Participant 31), and another stated that "integrating different data sources strengthens the interpretation of the results" (Participant 33). In addition, one student noted that "mixed methods help researchers better understand participants' experiences while also identifying patterns in the data" (Participant 36). Collectively, these responses show that students see data integration as a key feature of MMR that deepens interpretation and overall understanding of research findings.

Theme 2: Strengthening Research Evidence and Methodological Compatibility

Another prominent theme that emerged from the analysis concerned MMR's role in strengthening research evidence and supporting the compatibility of qualitative and quantitative approaches. Many participants indicated that using multiple data sources enhances the credibility and validity of research findings. For example, one participant explained that "mixed methods provide a logic for strengthening the evidence produced by a research study because the findings can be supported by different types of data" (Participant 5). Similarly, another student noted that "using both qualitative and quantitative data allows researchers to validate their findings" (Participant 11).

Participants frequently cited triangulation as an important benefit of mixed-methods research. Several students emphasized that using different types of data helps confirm research results and improve the reliability of conclusions. For instance, one participant stated, "Combining both types of data increases the reliability of the research results" (Participant 14). Similarly, another participant explained that "mixed methods enhance the validity of findings because the results can be confirmed through different sources" (Participant 17). Other participants expressed similar views, noting that "the use of multiple data sources strengthens the credibility of the research" (Participant 21), "triangulation helps ensure that the results are accurate and trustworthy" (Participant 25), and "mixed methods help verify conclusions through both numerical and narrative evidence" (Participant 28).

Students also demonstrated awareness of the philosophical foundations of MMR, particularly the role of pragmatism. One participant explained that "MMR adheres to the philosophy of pragmatism because it focuses on using the most appropriate methods to answer the research question" (Participant 30). Another participant noted that "pragmatism allows researchers to combine qualitative and quantitative approaches without being restricted by methodological boundaries" (Participant 34). Similar perspectives were expressed by other students who indicated that "pragmatism supports the practical use of multiple research methods" (Participant 37), that "MMR focuses on solutions rather than choosing only one methodological approach" (Participant 40), and that "the pragmatic approach allows researchers to select methods that best address the research problem" (Participant 43).

Participants also referred to the compatibility thesis, which holds that qualitative and quantitative methods can be integrated within a single research design. For example, one

participant stated, "The compatibility thesis shows that qualitative and quantitative methods can work together" (Participant 16). Another participant explained that "mixed methods demonstrate that different research paradigms can complement each other" (Participant 19). Similarly, students noted that "combining methods allows researchers to benefit from the strengths of both paradigms" (Participant 23) and that "qualitative and quantitative approaches are compatible when used to answer the same research question" (Participant 27).

In addition, several participants discussed strategies for mixing data, including intermethod and intramethod approaches. One student explained that "intermethod mixing allows researchers to combine surveys with interviews or observations" (Participant 32). Another participant noted that "intramethod mixing can occur when both qualitative and quantitative elements are used within the same instrument" (Participant 35). Additional responses indicated that "using multiple data collection methods increases the richness of the research data" (Participant 38) and that "combining different methods helps capture multiple dimensions of the research problem" (Participant 42). These responses suggest that students recognize the methodological and philosophical foundations underpinning the integration of qualitative and quantitative approaches in mixed-methods research.

Research Question 2: What role does peer feedback play in shaping graduate students' perspectives on applying MMR fundamentals to data collection?

Analysis of the reflective responses revealed that peer feedback played a significant role in shaping students' understanding and application of mixed methods research concepts. Participants described peer interactions as valuable opportunities for clarification, reflection, and collaborative knowledge construction. One major theme emerged from the data: collaborative learning through peer feedback. This theme illustrates how students used peer dialogue and feedback exchanges to deepen their comprehension of mixed methods research, refine their thinking, and strengthen their ability to apply research concepts in practice.

Theme 3: Collaborative Learning Through Peer Feedback

The third theme that emerged from the analysis highlighted the role of peer feedback in shaping students' understanding of MMR. Participants reported that discussions with classmates clarified methodological concepts and created opportunities for collaborative learning. For example, one participant explained, "Peer discussions helped me understand how qualitative and quantitative data can be integrated effectively" (Participant 4). Another participant noted that "listening to classmates' perspectives helped me better understand MMR" (Participant 8).

Several students also indicated that peer feedback helped improve their research design and data collection strategies. One participant stated, "Peer feedback helped me refine my data collection plan" (Participant 13), while another explained, "Class discussions allowed us to share ideas about how to combine methods" (Participant 18). Similarly, another participant noted that "feedback from classmates helped identify weaknesses in my research design" (Participant 21). Other students reported that "peer suggestions helped me think critically about my methodology" (Participant 26) and that "collaborative discussions improved my understanding of mixed methods concepts" (Participant 30).

Participants also indicated that peer interaction helped clarify how to integrate qualitative and quantitative data. One student explained that "peer feedback helped clarify how to integrate quantitative and qualitative data" (Participant 33). Another participant stated, "Classmates'

comments helped improve my research questions and data collection strategy" (Participant 36). Several participants also noted that peer support increased their confidence in applying mixed methods approaches. For example, one participant stated, "Sharing ideas with peers increased my confidence in using mixed methods" (Participant 41). Another explained, "Peer support encouraged me to apply mixed methods in my own research project" (Participant 45). These findings suggest that peer interaction within the online learning environment plays a meaningful role in supporting graduate students' methodological learning and confidence.

Discussion

The findings of this study indicate that graduate students perceive MMR as a valuable approach for enhancing the depth, validity, and comprehensiveness of research during the data collection phase. Students emphasized the importance of integrating quantitative and qualitative data to provide a richer understanding of research problems. This perception aligns with the work of Creswell and Plano (2018), who describe MMR as an approach that combines quantitative and qualitative data to gain a more complete understanding of research questions.

The finding that graduate students view mixed methods research as a powerful approach for addressing complex research questions and producing robust evidence is consistent with prior research showing that students tend to perceive mixed methods designs as more valuable, methodologically rigorous, and capable of providing deeper insights than single method approaches (McKim, 2016). However, studies examining researchers' actual use of mixed methods indicate that variability in understanding and integration skills can constrain how effectively researchers translate this perceived strength into practice, suggesting that awareness of MMR's value does not automatically guarantee high quality integration or robust evidence without sufficient methodological expertise (Alhassan, 2024).

The data integration theme identified in this study aligns with the fundamental principles of MMR. According to Creswell and Plano (2018), integration is the defining characteristic of MMR, occurring when qualitative and quantitative components interact to generate new insights. Participants in this study similarly recognized that meaningful findings emerge when both data types intersect. Conversely, Almalki (2012) reviewed the literature on integrating quantitative and qualitative data and concluded that using both approaches can provide greater depth and breadth of information, which is not possible with single approaches in isolation. This supports participants' views that integration enriches understanding.

The findings also highlight the importance of triangulation and methodological complementarity in strengthening research evidence. Students noted that combining multiple data sources enhances the credibility and validity of research findings. This observation supports prior research in Educational Research, which suggests that triangulation increases the robustness of research outcomes by confirming findings across different forms of evidence. The perception that triangulation enhances credibility and validity is supported by studies showing that mixed methods can illuminate and reconcile differing findings across data types, thereby strengthening confidence in the results (Tonkin-Crine et al., 2016). However, some methodological critiques argue that triangulation is not universally necessary and should not be assumed to improve validity without clear justification, especially when a single method could effectively address the research questions (Sim & Sharp, 1998).

Another important finding concerns students' awareness of the philosophical foundations of mixed-methods research, particularly pragmatism. The pragmatic paradigm emphasizes the

practical use of research methods to address complex problems, allowing researchers to draw from both qualitative and quantitative traditions. Students' recognition of pragmatism indicates an emerging understanding of the theoretical underpinnings of MMR. However, some scholars argue that alternative philosophical positions, such as realism, can also support MMR and may offer distinct theoretical advantages, suggesting that pragmatism should not be viewed as the sole foundation (Allmark & Machaczek, 2018).

Finally, the study highlights the significant role of peer feedback in shaping students' methodological perspectives. Collaborative discussions allowed students to refine their research ideas, deepen their methodological understanding, and gain confidence in applying mixed approaches. These findings align with literature on peer assessment feedback in higher education, which suggests that peer interaction enhances critical thinking and supports the development of research skills (Awuonda et al., 2025). Additionally, studies in graduate research education show that peer review of research proposals, data collection plans, or methodological designs helps students identify weaknesses, refine research questions, and strengthen methodological rigor (Cho & MacArthur, 2010). Similarly, peer feedback has been found to deepen students' understanding of research paradigms and mixed-methods integration, as discussing approaches with peers encourages critical reflection and confidence in applying both qualitative and quantitative techniques (Topping, 2009).

Conclusion and Limitations

The findings indicate that graduate students view mixed-methods research as a valuable approach for enhancing comprehensiveness, validity, and interpretive depth of research during data collection. Students emphasized that integrating quantitative and qualitative data enables researchers to capture both measurable patterns and contextual insights, yielding richer, more meaningful findings. The study also highlighted students' recognition of the philosophical and methodological foundations of mixed-methods research, including pragmatism, intermethod and intramethod data integration, and the compatibility of qualitative and quantitative approaches.

Peer feedback also emerged as an important factor in shaping students' understanding and application of MMR principles. Collaborative discussions and constructive feedback helped refine research designs, strengthen methodological skills, and build confidence in integrating multiple data sources. These findings emphasize the dual importance of methodological knowledge and peer-supported learning in academic research.

One major limitation of the study is that archival data were not collected for this study's research purposes. There may be missing information, selective coding, or context-specific biases. However, thematic analysis allowed us to acknowledge these limitations while still identifying meaningful patterns.

Recommendations and Future Studies

Based on this study's findings, several recommendations can enhance the application of MMR fundamentals in academic research. First, educators should provide structured opportunities for students to practice integrating quantitative and qualitative data during the research process. This could include exercises that explicitly focus on intermethod and intramethod mixing, as well as assignments that encourage reflection on how data integration contributes to research validity and comprehensiveness. Incorporating discussions about the philosophical foundations of MMR,

particularly pragmatism and the compatibility of qualitative and quantitative approaches, may also deepen students' understanding and strengthen their methodological reasoning.

Second, graduate-level research courses should systematically incorporate peer feedback. Collaborative learning environments allow students to share diverse perspectives, refine research designs, and gain confidence in applying complex methodological concepts. Structured peer review sessions, guided group discussions, and collaborative projects can facilitate these benefits and enhance students' overall research competencies.

For future studies, researchers could examine the perspectives of students from different disciplines or educational contexts, which may reveal variations in how MMR principles are understood and applied. Additionally, future research could incorporate observational or performance-based assessments to complement self-reported perspectives and provide a more comprehensive view of how graduate students operationalize MMR principles in practice.

Author Contributions

Author 1: Conceptualization, methodology, investigation, data curation, formal analysis, writing original draft preparation, and project administration.

Author 2: Methodology, formal analysis, interpretation of findings, writing- review and editing, and supervision.

Both authors contributed to developing the manuscript, critically reviewed the final version, and approved it for publication.

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Institutional Review Board Statement

The Institutional Review Board (IRB2026-99 - Initial: Exempt Approval) of Texas Tech University reviewed and approved the study. The study involved the secondary analysis of archival, de-identified student responses originally collected as part of a graduate research methods course. All identifying information was removed before analysis, and the study followed institutional requirements for research involving human participants.

Informed Consent Statement

Informed consent was not obtained at the time the original course assignment was completed because the responses were initially collected for educational purposes rather than research. The researchers subsequently obtained Institutional Review Board approval to conduct secondary analysis of the de-identified archival data. The research dataset included no personal identifiable information.

Data Availability Statement

The data analyzed in this study are not publicly available because they consist of student-generated educational records and contain potentially identifiable information. De-identified data

may be available from the corresponding author upon reasonable request, subject to institutional, ethical, and confidentiality requirements.

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Conflicts of Interest

We have no conflicts of interest to disclose.

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