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Trends and Challenges in Mixed Methods Educational Research: A Comprehensive Analysis of Empirical Studies

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ABSTRACT

The mixed methods research approach combines quantitative and qualitative methodologies to comprehensively understand complex research questions, particularly valuable in educational studies. This study critically examines adopting and utilizing mixed methods in Chinese educational research by analyzing 105 empirical studies published in major Chinese academic databases from 2002 to 2023. Using a framework based on established mixed-methods criteria, researchers evaluated these studies across five dimensions: research objectives, rationale for mixed methods, methodology and sample size, design type, and journal category. The findings reveal that while mixed methods usage in Chinese educational research has grown significantly since 2018, especially with a preference for explanatory sequential and concurrent designs, many studies lack clarity in articulating the rationale behind their methodological choices. This lack of transparency limits the potential of mixed methods to address educational challenges in depth. Additionally, data collection methods remain limited, relying on questionnaires and interviews and less frequently using techniques such as observations and experiments. High-quality journals show a preference for rigorously conducted mixed-methods research, underscoring the importance of methodological rigor. This study advocates for improved alignment of research questions, clearer rationale, and diversified data collection to enhance methodological robustness in future mixed methods educational studies in China.

INTRODUCTION

The mixed methods research approach emphasizes integrating quantitative and qualitative methods within a single study or series of studies to leverage the strengths and mitigate the limitations inherent in each method individually (Creswell & Clark, 2023; Creswell & Creswell, 2017). This methodological approach aims to provide a more comprehensive understanding and interpretation of research questions by broadening the scope of inquiry, enhancing understanding, and enabling iterative validation. Common elements that link quantitative and qualitative methods include shared perspectives and complementary skills in data collection, analysis, and interpretation (Headley & Plano Clark, 2019; Hernaus et al., 2024; McCrudden & Marchand, 2020). Creswell and Clark (2023) note that mixed methods research is especially valuable in addressing several key research challenges: (1) complementing incomplete data sources, (2) expanding explanations for preliminary findings, (3) enabling generalization of exploratory research, (4) deepening insights into specific research phases,

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(5) aligning with particular theoretical perspectives, and (6) addressing complex research objectives through multi-phase studies.

The mixed methods approach in educational research is particularly advantageous given the multifaceted nature of educational phenomena. Beyond merely quantifying aspects like test scores or graduation rates, educational research frequently seeks to explore the underlying reasons, processes, and conditions shaping these outcomes (Plano Clark, 2019; Timans et al., 2019). Mixed methods provide researchers with tools to investigate these complexities holistically by blending statistical data with in-depth, descriptive insights. Moreover, educational settings involve diverse stakeholders, dynamic interactions, and contextual factors that are challenging to capture through a single-method approach (Hitchcock & Onwuegbuzie, 2019; McCrudden et al., 2019; Mikalef et al., 2019). By integrating both approaches, researchers can better capture the nuanced dynamics within educational systems and derive more comprehensive conclusions.

In Chinese educational research, adopting mixed methods has gained significance due to the increasingly complex demands of educational reform and systemic transformation. China's educational system, facing challenges such as equitable resource distribution, curriculum reform implementation, quality assessment, digital integration, and student development evaluation, necessitates a methodological approach that can address multifaceted issues with precision and depth (Fan et al., 2020; Lawrence & Wu, 2021; Ren & Zhou, 2024). The growing emphasis on evidence-based policymaking and continuous improvement in education underscores the value of mixed methods in supporting systematic measurement and qualitative insights (Plano Clark, 2019; Şahin & Ozturk, 2022; Timans et al., 2019). Despite this potential, recent studies indicate that Chinese educational researchers predominantly use quantitative or qualitative methods independently, resulting in fragmented perspectives that lack comprehensive explanations of complex phenomena (Gallant & Luthy, 2020; Ren & Zhou, 2024).

Over a decade ago, Zhou and Creswell (2012) identified an increasing trend in adopting mixed methods among Chinese scholars, particularly in education and social sciences, noting a need for further investigation across various disciplines within China. In response to this call, the current study aims to critically examine the adoption and utilization of mixed methods in Chinese educational research. This study specifically explores the trends, challenges, and implications of mixed methods in published empirical education studies within Chinese academia, offering a systematic analysis of articles published in major databases from 2002 to 2023. By systematically reviewing these studies, this research seeks to identify prevailing trends in methodological applications, evaluate the rigor with which mixed methods are applied, and elucidate the potential of this approach to address complex educational issues in China. Through this analysis, researchers aim to contribute to best practices in educational research methodologies and advance a nuanced understanding of how mixed methods research can enhance the quality and impact of educational research within the Chinese educational landscape.

METHODS

This study conducted an electronic search of three major Chinese academic databases: the Chinese National Knowledge Infrastructure (CNKI), VIP Journals Database, and Wanfang Database, covering publications up to November 2023. The search terms used were 'mixed research method' (混合研究方法) and 'mixed method' (混合方法) within the field of education for articles published from 2002 onward, marking the emergence of mixed methods research in Chinese literature. This initial search yielded 176 articles.

Researchers applied the following inclusion criteria to refine the sample. First, researchers included only peer-reviewed articles published in Chinese academic journals, as these typically undergo rigorous review, ensuring the research quality and validity. Second, researchers focused exclusively on empirical studies within educational contexts, excluding theoretical papers on mixed methods that lacked data collection and analysis. Finally, only studies explicitly identified as using mixed methods—employing both quantitative and qualitative methodologies—were selected to maintain methodological consistency. After these criteria were applied, 105 representative empirical educational studies using mixed methods were retained for analysis.

The comparative framework used in this review draws from established mixed-methods review frameworks. Gallant and Luthy (2020) emphasized the importance of addressing research purposes, paradigms, and methodological integration. More recent frameworks by Kermarrec et al. (2022) and Davis et al. (2023) include participant selection, data collection techniques, analysis approaches, and mixed-method design rationale. Based on these, researchers analyzed the 105 selected studies across five dimensions: (1) research objectives, (2) rationale for mixed methods adoption, (3) methodology and sample size, (4) mixed methods design types, and (5) research purposes.

Each of the five dimensions was coded systematically. The research objectives addressed specific questions that mixed methods aimed to answer by integrating quantitative and qualitative data. The rationale articulated why mixed methods were necessary for each study's objectives (Clark & Ivankova, 2016). The methodology and sample size encompassed details on research techniques and participant numbers, ensuring comparability. Researchers categorized studies by their mixed methods design—concurrent, explanatory sequential, exploratory sequential, or embedded (Creswell & Creswell, 2017)—with each design meeting distinct research needs. Finally, research purposes clarified the intent behind mixed methods, aligning with Gallant and Luthy's (2020) perspective on achieving complementary insights.

A detailed description of each design type guided the coding process. For example, the concurrent parallel design allows simultaneous collection of quantitative and qualitative data, enabling integration for comprehensive analysis. This design facilitates cross-verification and in-depth insight, although researchers must address potential contradictions between datasets (David L. Morgan, 2022; Şahin & Ozturk, 2022). The explanatory sequential design begins with quantitative data collection to establish trends or relationships, followed by qualitative analysis to explore deeper interpretations, which is ideal for uncovering new questions arising from initial results. Exploratory sequential designs begin with qualitative research to identify variables and construct quantitative instruments suited for novel or exploratory studies (Kelle et al., 2019; Timans et al., 2019). Finally, the embedded mixed methods design integrates supplementary data collection within a primary quantitative or qualitative study, enriching the primary analysis while minimizing additional resource demands (Creswell & Clark, 2023).

This study also analyzed journal quality by including articles from the Chinese Social Sciences Citation Index (CSSCI), the Index of Core Journals of China (CORE), and non-indexed journals. CSSCI and CORE journals, managed by Nanjing University and Peking University, respectively, are highly regarded for their impact in Chinese academic fields (Cong et al., 2022; Liang & Xu, 2020; Wang, 2023), including non-CSSCI/CORE journals allowed for a more comprehensive review of mixed methods applications in Chinese educational research.

Two authors independently coded each article, followed by discussions to reconcile differences to enhance the reliability of the researchers' coding. A third independent reviewer resolved any remaining discrepancies, establishing inter-rater reliability and reinforcing the validity of our analysis (Belur et al., 2021). Through this rigorous methodological approach, researchers aim to present a systematic overview of mixed methods applications in Chinese educational research, contributing valuable insights into methodological best practices within this context.

RESULTS

The results revealed that 105 educational research papers published in Chinese used mixed methods. Figure 1 illustrates the number of publications each year from 2010 to 2023. Researchers can observe certain trends in the publications over the 13 years. First, the number of publications using mixed methods was relatively low between 2010 and 2017, often less than five articles yearly. Second, there has been a significant increase in mixed methods research publications since 2018. This rise may correlate with the growing recognition of the limitations of single-method studies and an increasing appreciation for methodological pluralism in addressing complex educational issues.

The growth appears to accelerate from 2020 to 2022 before seeing a slight decrease in 2023 (although it should be noted that the data for this study was collected up to November 2023, i.e., not a full year). Overall, the trend shows some fluctuations in publication numbers in the first eight years and then steady growth between 2018 and 2022, with a slight decrease in 2023.

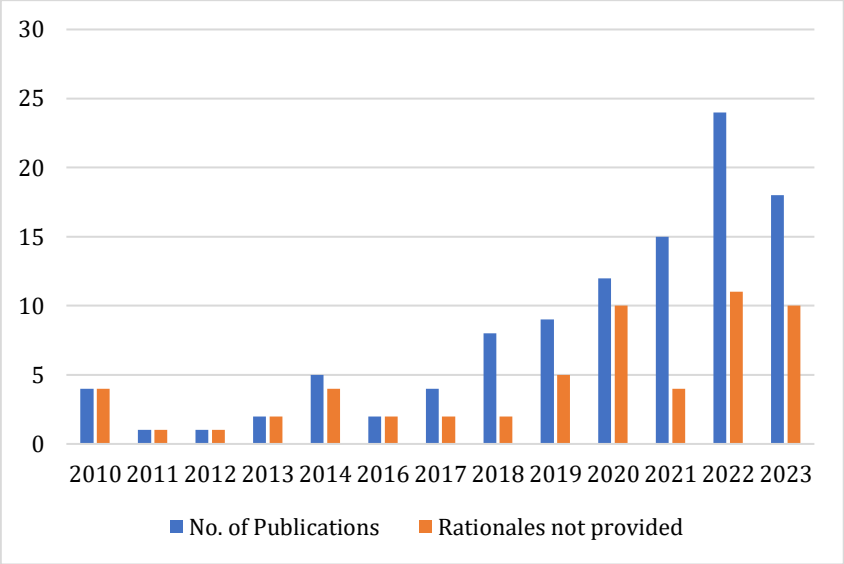

Figure 1. Number of Publications by Year

Based on the above research framework, this section analyses these research papers in terms of five dimensions: research objectives/questions, reasons for adopting a mixed-methods approach, research method and sample size, type of mixed-methods research design, and journal category. The information on all the empirical studies is presented in the Appendix.

Research Objectives/Questions

After reviewing all the 105 empirical studies, researchers found that 34 articles (32.4%) explicitly indicated their research objectives or questions. Often, there were two to three questions in place for the mixed methods design to explore further. Five studies even had four identifiable research questions. For the remaining two-thirds of the empirical studies, the statement of the research objectives/questions was unclear, and some were even very vague.

Reasons for Adopting Mixed-methods Approach

Only 44% of the studies provided specific reasons for adopting a mixed methods approach. Some authors refer to the mixed methods literature to lay a solid foundation for choosing a research design type. Nonetheless, 59 empirical studies did not value the explanation of rationales. The authors detailed how they conducted their research but failed to explain why a mixed methods design was chosen or the fitness between research questions and methods.

Furthermore, in Figure 1, researchers added a parameter called "Rationales not provided" (represented by the orange bars), meaning that researchers could not identify a clear reason for using mixed methods design in these studies. Between 2010 and 2017, the blue and orange bars were almost the same height, which could mean that all the published mixed methods articles did not explicitly state the rationales for using a mixture of quantitative and qualitative methods. The orange bars also show an increasing trend, often mirroring the overall increase in total publications, particularly from 2020 onwards. It suggests that while mixed methods are growing, the explicit justification for their use is not always present in published work.

Research Method and Sample Size

Regarding research methods, 96 studies explicitly indicated using interviews, whereas nine studies did not. Questionnaires were used in 97 empirical studies, while the remaining eight studies did not explicitly mention whether they used this method. Thus, interviews and questionnaires are prevalent in the Chinese educational research community. However, other quantitative and qualitative techniques were much less common. For example, eight studies merely mentioned observation, and only three articles employed experiments. As far as sample size is concerned, researchers observed

significant variations. More specifically, in the quantitative part, the maximum sample size reached 19,743, and the minimum was 32, which indicated a huge difference. In the qualitative part, the sample size varied between 3 and 90.

Type of Mixed Methods Research Design

In terms of the mixed methods research design type, the explanatory sequential design (type 'II') was the most prevalent (49%), followed by the convergent parallel design (type 'I') (30%). The numbers of exploratory sequential design (type 'III') and the embedded or nested design (type 'IV') were much lower (Figure 2).

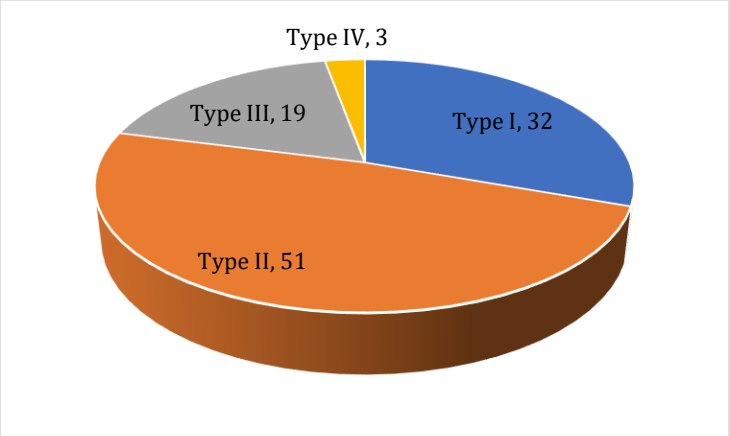

Figure 2. Type of Design

Figure 3 represents the distribution of four design types between 2010 and 2023. Type I was most prevalent initially in the year 2010 and showed a steep decline in 2011, then continues to show moderate fluctuations but shows a very slight upward trend starting from 2018 and peaking in 2023. The increase in 2023 may demonstrate a renewed interest in this comprehensive approach, possibly to address intricate, multifaceted education inquiries. Type II has a more marked upward trend after 2017, with a noticeable peak in 2022, which might indicate that the preference for this type of design is already showing its way to an upward trend in recent years. The predominance of explanatory sequential designs (Type II) in the Chinese educational research community reflects the preference of the researchers to explain the quantitative findings using qualitative data. It fits into the Chinese educational context where, though traditionally an emphasis on quantitative measurements such as test scores, there is an emerging recognition to understand the underlying factors through qualitative investigation. Type III has a rather constant, albeit low, presence, with slight increases after 2020 but still lower than Type I and Type II. It suggests that researchers prioritize designs that provide more immediate or direct explanations of quantitative results (Type II) over those that start with qualitative exploration. However, perhaps the rise reflects a methodological shift in engaging new educational issues in China, for which preliminary qualitative findings may be insightful and complex social and educational phenomena tested quantitatively. Type IV appears only in 2021 and 2022, few every year without any consistent upward trend, perhaps the least favorite or relevant design type compared to other designs in this period. Its limited use may be attributed to challenges in resource allocation, data integration complexity, or the lower demand for studies that necessitate this specific type in Chinese educational research. The additional expertise and planning required for this approach and researchers' limited understanding or knowledge could also be the barriers.

Generally, the trend indicates an increase in adopting a mixed methods approach in the Chinese education research community throughout the thirteen years, with a strong preference for Type II and Type I, steady but moderate use of Type III, and minimal reliance on Type IV.

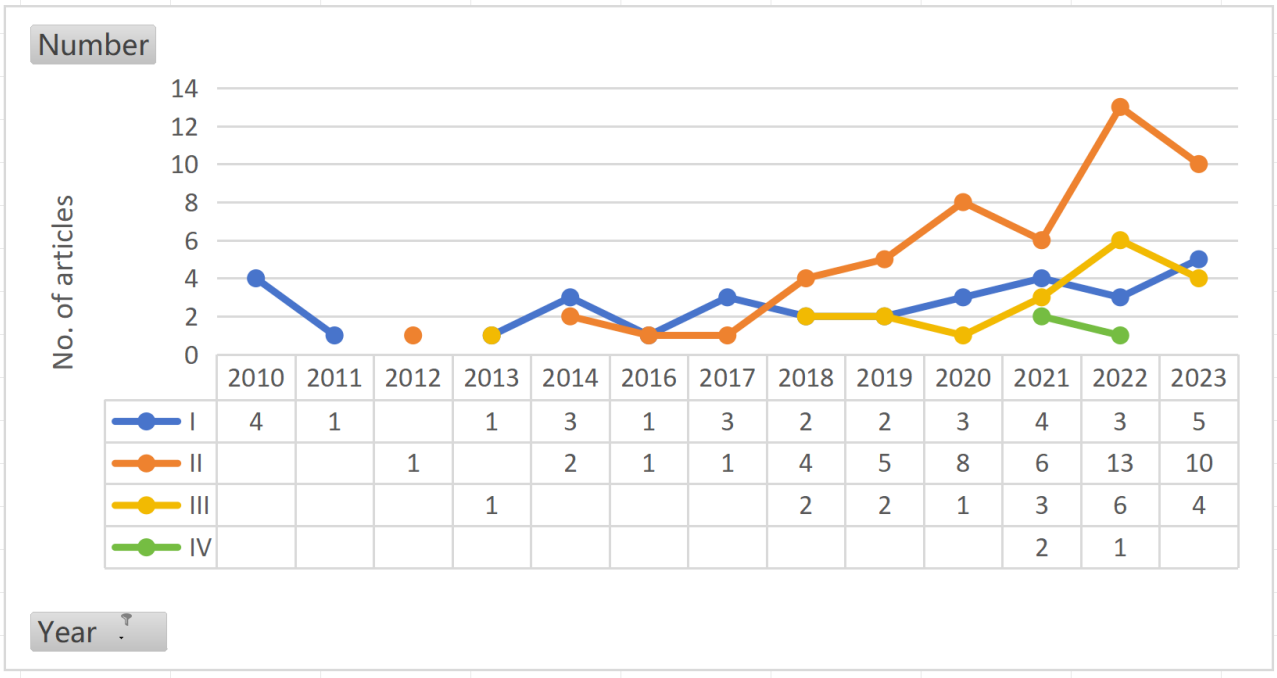

Figure 3. Types of Design by Years

Category of Journal

According to Figure 4, the majority of mixed-methods research papers, accounting for 72% (76 out of 105), were published in high-prestige journals, with 54% in journals indexed by both CSSCI and CORE, demonstrating an obvious preference for sharing their findings in high-impact journals. The next largest share, 14%, appears in CORE journals, followed by 4% in CSSCI-only journals, indicating a slightly lesser emphasis on CSSCI-exclusive publications. It needs to be clarified that the number of CSSCI-only journals publishing education research papers is rather small, which is why the proportion is so low (4%). Notably, the remaining 28% were published in non-CSSCI/CORE or ordinary journals, representing lower academic prestige. It suggests that a substantial portion of mixed methods studies does not meet the selectivity criteria for high-impact journals, potentially demonstrating either a broader dissemination strategy or varying levels of research rigor and impact.

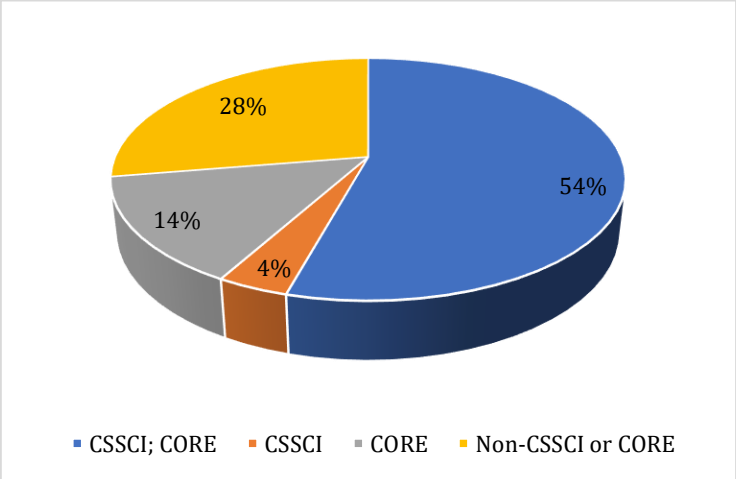

Figure 4. Category of Journals

DISCUSSION

Cresswell and Clark (2023) suggest that researchers who use mixed methods research state the research questions for different types of methodologies in a clearer and more detailed manner.

However, the literature collected for this research showed that the research questions in some papers were so general that it was difficult to discern which could be answered through qualitative and quantitative methods. Our statistics show that only 34 articles explicitly list their specific research questions (usually, more than one question was stated). Vague research questions may lead to ambiguity in the statement of the underlying rationale or even fail to elaborate the rationale. Therefore, this paper suggests formulating an overarching research question before specifying the sub-questions to be addressed. In this way, the basic rationale for selecting a particular mixed methods approach can be better considered.

Regarding the basic reasons for adopting a mixed methods approach, most studies lacked a profound understanding of the mechanism of mixed methods research and a well-developed elaboration of related theories. Some authors write very little about their reasons for choosing a particular typology of mixed methods design (Şahin & Ozturk, 2022; Strijker et al., 2020; Timans et al., 2019). The application of mixed methods was rather arbitrary, as the researchers attached little significance to elaborating the connection between their research questions and the selected mixed methods approach. Most writers emphasized the 'how' rather than the 'why'. They detailed the data collection procedures but failed to account for their choice of a specific mixed methods design. Most of the studies could differentiate between different types of mixed methods research designs and articulate to some extent each stage's research tasks and contents. For example, in some studies that adopted an explanatory sequential design, it was clearly stated that the goal of the design was to use qualitative data to explain the preliminary quantitative results and that the quantitative data were collected before the qualitative data, with the two types integrated into the explanatory phase of the study. However, there was no further clarification of why the study adopted this type of design, which indicates a lack of clarity in connecting its research objectives with the rationale for the selected type of design. This problem is similar to Davis et al.'s (2023) recent finding that researchers often fail to link the research questions and the mixed methods design explicitly.

Another problem for many studies, similar to what Davis et al. (2023) uncovered in their methodological review, is that they concentrate on the reasoning for a particular method rather than the mixed methods design. Regardless of the motivations behind employing multiple methodologies, it is crucial that authors clearly articulate these reasons. This transparency enables us to evaluate the suitability of the design choice for addressing the research inquiry (de Haan et al., 2020; Lee et al., 2021). A lack of clarity of rationales for mixed methods usage in many education studies may affect the field's understanding of mixed methods (Åkerblad et al., 2021; Fàbregues et al., 2022; Wilkinson & Staley, 2019). When the explicit justification is unclear or even missing, adopting mixed methods could be superficial, i.e., the researchers take advantage of mixed methods without fully appreciating its merits of providing a more nuanced understanding of complex issues (Khoo-Lattimore et al., 2019; Mele & Belardinelli, 2019). It may also make it difficult for researchers to recognize what valuable research findings their research can lead to or provide novel insights to promote the improvement and progress of the theory (Guetterman et al., 2017; Huynh et al., 2019). Also, readers may question the soundness of the study design due to unclear explanations to support the use of mixed methods, thereby affecting the validity of findings (Fàbregues et al., 2021; Hendren et al., 2023).

Future studies should explicitly elaborate on the reasons for adopting certain mixed-methods designs, articulating how the design contributes to the objectives and questions. According to Gallant and Luthy (2020), five purposes—triangulation, complementarity, development, initiation, and expansion—researchers should consider their study's purpose and carefully choose their design to promote methodological compatibility. Researchers also recommend that scholars compare mixed methods design and pure quantitative or qualitative design among different categories of mixed methods design. Moreover, in the future, researchers are recommended to explore certain underexplored areas where mixed methods might offer unique insights, such as in evaluating online learning platforms or in the studies related to the experience, feelings, process, and outcome of using digital facilities and AI equipment. Researchers need to consider if it is truly necessary to address the questions utilizing mixed methods and further what type of design can be helpful when thoroughly understanding its rationales. To improve the methodological rigor, researchers should make sure that their studies are guided by a clear understanding of the different paradigms that can inform mixed methods research (e.g., pragmatism) and how these paradigms influence design choices (Ghiara, 2019;

Khoo-Lattimore et al., 2019). They should further clarify the rationales for mixed methods designs, and ensuring the coherence between research objectives/questions and chosen methods is essential. Engaging in methodological training sessions and programs may help achieve this.

There is also a wealth of grounded theoretical studies and writings on mixed methods research by Western researchers, including Cresswell and Plano Clark's volume (2023) and an array of journals specializing in mixed methods research, such as the Journal of Mixed Methods Research, Quality & Quantity, Field Methods, and the International Journal of Multiple Research Approaches. Furthermore, some foreign scholars' works on mixed research methods have been translated into Chinese and published, and there is a significant quantity of Chinese literature on mixed research methods. This review found that while the Chinese education researchers were aware of the experts in the field, only a few authors explicitly drew on the literature. Researchers agree with Corr et al. (2020), who write that when using mixed research methods, scholars need to indicate their purpose(s) and strategy for mixing methods, accurately provide the data gathering and analyzing process (including data integration), and state the rationale behind those decisions and actions. Although research articles adopting mixed methods design sometimes might be constrained by word limits, they should emphasize the incorporation of core attributes associated with mixed methods research, such as the rationale for mixing, design characteristics, analysis and integration procedures for each approach, and overall quality guidelines to facilitate understanding, promote the proper application of common terms (such as triangulation) and ensure the defensibility of methodological decisions (Corr et al., 2020; Strijker et al., 2020; Wenger-Trayner et al., 2019). Researchers suggest that scholars in China should focus on linking their research with established literature and communicating to their readers the reasons for choosing a particular mixed-methods design from a more theoretical perspective.

Summarising the reasons for using mixed research methods in these studies, researchers confirm the first three purposes Gallant and Luthy (2020) claimed: triangulation, complementarity, and development. This study shows that the most prevalent purpose was complementarity (61 studies), followed by triangulation (36 studies) and development (20 studies). The other two purposes (initiation and expansion) were absent. Different research purposes imply that different mixed methods models have distinct roles and values and cannot be substituted for each other. Researchers must fully recognize and understand these different purposes and consider how to design and implement their mixed methods research to reflect them accurately. Researchers in education can better maximize the beneficial effects of mixed methods research by extending the purposes for which they are used.

Regarding research methods and sample size, almost all studies applied the two most basic data collection techniques, questionnaires, and interviews; few utilized other research techniques (e.g., observation focus groups). It suggests that there may be a need for more diversified data collection methods in mixed methods studies. Diversification of data collection in mixed-methods studies can add strength and depth to findings, while multiple perspectives can be integrated for increased validity and comprehensiveness (Creswell & Clark, 2023; Davis et al., 2023; Kermarrec et al., 2022). Data from multiple sources can be used for triangulation to reduce bias and deepen the analysis in a specific context (Dopp et al., 2019). The sample size is an important aspect of mixed-method design, ensuring that the quantitative piece can give enough power to detect significant effects, whereas the qualitative part can gather thick and extensive data. Determining sample sizes in quantitative and qualitative phases enhances the validity, reliability, and overall depth of the research findings (Timans et al., 2019).

In terms of sample size, while this paper found that a large sample size did not guarantee publication in a high-quality journal, further analysis showed that CORE- and CSSCI-accredited journals preferred findings developed from a large sample size. In terms of the typology of mixed methods designs, the reason for the explanatory sequential design's most favored status may relate to the advantages previously stated in this article: it is simple to design, easy to implement, and convenient for description and reporting. From another perspective, it also reflects that mixed methods educational studies in China still lack typological richness. Mixed methods research should be more diversified to reflect the value and functionality of different types of mixed methods designs: the prevalence of a single mixed methods approach is not conducive to a comprehensive understanding of the research problem from multiple perspectives. In addition to the four basic types of mixed methods designs, other, more sophisticated designs (e.g., multi-phase designs) exist, which researchers have largely failed to employ (Meng & Liu, 2023; Strijker et al., 2020; Zhou & Creswell, 2012). Researchers in China should learn about

these more complex mixed methods design solutions and consider applying them to their research to develop a new understanding of their research problems.

Regarding the category of journals, our statistics indicate that high-quality journals are not biased against mixed-methods research papers; in fact, they seem to favor rigorously conducted mixed-methods research. However, those mixed methods studies published in non-CSSCI/CORE journals tend to be of average quality, even though they are more time-consuming, consume more human and financial resources than other non-empirical studies, and require researchers to put in considerable practical work. Therefore, mixed methods research should be carefully planned step by step; researchers should strictly follow the relevant methodological requirements and coordinate the data collection and analysis of both qualitative and quantitative surveys.

An analysis of the year of publication of the 105 articles shows that although the number of mixed methods educational studies was initially limited, a noticeable upward trend emerged from 2018 onwards. In particular, the number of published articles using mixed methods designs in recent years is significantly higher than in previous years. It indicates that mixed methods research is gaining more attention in educational research. This trend is expected to grow as there is an increasing recognition of the usefulness of mixed methods research in exploring and understanding educational problems. Even though designing, conducting, and reporting mixed methods studies remains a challenge, researchers would expect the prevalence of such a design in future educational studies in China.

CONCLUSION

This research highlights significant gaps and emerging trends in using mixed methods research within Chinese educational studies. While adopting mixed methods has increased, especially since 2018, the clarity of research questions and articulating the rationale for mixed methods remain areas requiring improvement. Many studies reviewed lacked specific, well-defined research questions, often leading to ambiguity in the underlying rationale for combining quantitative and qualitative approaches. The findings indicate a need for clearer theoretical justifications and a better alignment of research objectives with chosen mixed methods designs.

Furthermore, most studies focused on procedural explanations rather than providing substantive reasons for selecting particular designs, which can undermine the methodological rigor and comprehensiveness that mixed methods can offer. While complementarity, triangulation, and development were the primary purposes observed, other mixed methods goals, such as initiation and expansion, were notably underrepresented. This limited typological diversity suggests an opportunity for Chinese researchers to broaden their use of mixed methods designs to reflect a wider array of research purposes.

Scholars should clearly understand paradigms like pragmatism, develop explicit rationale, and diversify data collection methods to enhance depth and validity to strengthen future mixed methods research. The findings also suggest that high-quality journals favor rigorously conducted mixed-methods research, indicating an institutional preference for methodological rigor. As the trend toward mixed methods continues, researchers must cultivate a robust theoretical foundation and methodological coherence to maximize the potential of mixed methods research in advancing educational understanding in China.

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