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A Mixed Methods Process Evaluation of an Integrated Course Design on Teaching Mixed Methods Research

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Abstract

There is a critical need to conduct empirical studies on teaching mixed methods research (MMR). This study used a mixed methods process evaluation to provide practical guidance on effective design elements and impactful teaching approaches among five cohort groups of students (2016-2020) enrolled in a doctoral MMR course. Students engaged in hands-on data analyses with special attention to MMR writing structure. I shared topical outlines with corresponding teaching and learning activities from the design perspective, as well as course experience and impact including challenges and approaches taken to learn from student perspectives. I also highlighted four integrated course features/themes identified as the most helpful teaching approaches. The current study provides practical guidance on the integrated MMR course design and process evaluation contributing to the MMR field.

Keywords

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INTRODUCTION
The Growing Trends and Needs of Mixed Methods Research (MMR)
Researchers around the globe are embracing mixed methods research as an emerging promising approach to uncover complicated social, health, education, and interdisciplinary issues (Creswell & Plano Clark, 2018). Given the increasingly complex conditions surrounding many pressing societal issues, research using only quantitative or only qualitative approaches (i.e., mono method) has faced significant challenges (Teddlie & Tashakkori, 2009). Over the past three decades, the mixed methods research paradigm has emerged as a third alternative to quantitative and qualitative research paradigms. By integrating both qualitative and quantitative procedures, mixed methods research offers the power of numbers and stories for investigating complex social, behavioral, and health sciences questions (Creswell & Plano Clark, 2018).

Empirical data show that students desire earlier and continued exposure to mixed methods (Poth, 2014). McKim (2017) conducted a mixed method study that explored the usefulness of mixed methods from graduate students' perspectives. The findings showed that students scored higher in usefulness on mixed methods as a valuable and rigorous method that provides deeper meaning and multiple perspectives as compared to quantitative or qualitative design alone (McKim, 2017).

The Need for Teaching and Learning Research in Mixed Methods
Demands for MMR training is high as researchers are increasingly using MMR without substantive training in rigorous MMR methodology or techniques (Guetterman et al., 2017). Currently, there are few empirical studies examining topics related to teaching and learning mixed methods. Guetterman (2017) was among the first to use a proficiency framework to explore skills needed to conduct MMR and developed a typology of three levels of mixed methods proficiency: novices, researchers, and methodologists. This typology is helpful to learners, instructors, and mentors in developing courses, training workshops, and professional development plans.

Pedagogy Designs Promising to Teach MMR
There are continued scholarship needs in teaching MMR. How can we best train our next generation of MMR scholars to meet the needs of the rapidly changing society with complex social and health issues?

Practice-oriented teaching pedagogy aims for being adaptable in the application of methods and requires deepened learning and engagement. Researchers have advocated for a course-based service-learning model emphasizing practical hands-on activities to apply knowledge and skills learned in the classroom to real-life projects during the student competency-building process, as an effective high-impact teaching approach (Hou & Wilder, 2015). Empirical studies have shown significantly increased competencies and learning outcomes in the areas of program planning, development, and implementation (Hou & Pereira, 2017; Hou, 2009). Bazeley (2003) also recommended a hands-on approach to teach MMR to facilitate building on both the breadth and the depth of the essential research methodology foundation, integrating project experience with analysis techniques and practicing report writing skills (Bazeley, 2003).

Guetterman conducted a process evaluation of a mentoring-based MMR training program for faculty-level scholars and identified that an interactive small group, a project-focused discussion, and the opportunity of peer mentoring were critical to learning (Guetterman, Creswell, Deutsch, & Gallo, 2019). McKim (2017) suggested including the following when teaching MMR: discuss methodological strengths and weaknesses, mixed methods rationale, the timeline for data collection, description of the quantitative and qualitative components, and integrating both components (McKim, 2017).

GAP
An advanced search was conducted with keywords of mixed methods, course or training, teaching strategies, or methods in major databases. The results showed very limited literature dedicated to teaching MMR in graduate programs in higher education settings. Because of the relatively young and emerging MMR field, there is a continual need to conduct empirical studies and provide teaching examples of integrative course design and assessment for doctoral-level MMR courses in higher education settings (Poth, 2014).

Although studies focusing on how to teach mixed methods research courses have emerged in the past decade (Poth, 2014), overall, there is a lack of mixed methods research training for both students and faculties (Poth, 2014; Guetterman et al., 2018). We need more empirical studies to examine graduate training and share effective teaching strategies and course design elements (Christ, 2009). There is also a need for an integrative process evaluation instrument to capture effective design elements and course experience including challenges and approaches students took to learn to better guide course design for impactful learning among our future generations of MMR scholars and instructors.

PURPOSE

This study uses a mixed methods process evaluation of an integrated MMR course to provide practical guidance on effective design elements and impactful teaching approaches among five cohort groups of students enrolled in a doctoral MMR course during 2016-2020 (n=54). The course topic outline with corresponding detailed teaching and learning activities from the design perspective, as well as course experience including challenges and approaches taken to learn, and impact on MMR learning from students' perspectives, were analyzed and shared. The current study contributes to the overall scholarship of the teaching and learning community in the MMR-specific field. It provides empirical supporting data on course experiences and learning impact from students' perspectives to help MMR educators and researchers advance the teaching and learning scholarship of MMR.

METHODS
Course Design

PAF 7868 is a brand-new advanced methods course focusing on the modern mixed methods research methodology for interdisciplinary doctoral students in public affairs. The course development began during fall 2015 and the course was initially offered during spring 2016. It has been taught every spring as an advanced methodology course at a large public university in the southern United States.

The purposes of this course were to introduce doctoral students to (1) the emerging field of mixed methods research (MMR) while examining the types of research questions that can be answered by mixing quantitative and qualitative methods of inquiry; (2) the core and complex types of MMR designs, data collection strategies, and procedures for analyzing and integrating quantitative and qualitative data; and (3) the important issues and future directions of MMR and its application across disciplines. Students engaged in hands-on MMR data analyses from real-world projects and data sources. Throughout the course, I paid special attention to the MMR writing structure and process of developing MMR manuscripts for peer-reviewed journal submissions.

Six key integrative course elements provided interactive, practical learning experience through hands-on team-based MMR project applications to help equip essential MMR competencies. These included: (1) interactive class lectures and discussions; (2) multiple mini after-class assignments applying course content; (3) MMR case studies to deepen understanding of design procedures; (4) MMR article reviews to broaden ways to apply MMR; (5) MMR project peer reviews to encourage critical thinking and practice constructive peer reviews; and (6) the overall MMR project report to practice MMR writing and communication.

Course topics were organized by the comprehensive research process laid out by Creswell and Plano Clark's *Designing and Conducting Mixed Methods Research* textbook (Creswell & Plano Clark, 2018). This doctoral-level MMR course was aligned with carefully integrated assignments focused on developing relevant MMR competencies.

I designed homework for students to apply interactive class lectures and content immediately after class. Students identified MMR articles and reviewed MMR core features discussed in class, analyzed how existing MMR studies provided narrative hooks in introducing research topics, practiced drawing MMR project design diagrams, and discussed strengths and weaknesses of MMR data analyses and resulting display strategies. In addition, we discussed MMR case studies for deep-dive examinations of various core and complex MMR design applications. A comprehensive sophisticated MMR study on Cancer Screening Among Chinese Women (Hou, 2020; Hou & Fetters, 2019) was also introduced to deepen students' understanding of various MMR design applications from exploratory sequential design, mixed concurrent, and sequential process, to embedded evaluation designs (Hou, 2020; Hou & Fetters, 2019).

The article reviews asked students to identify an empirical or methodological MMR article in the student's areas of interest. Then they (a) present a summary following the rubric, (b) discuss strengths and weaknesses of the study, and (c) lead a class discussion on MMR critical issues, including potential alternative approaches to address study weaknesses.

Real-life MMR project databases were provided for students to practice hands-on integrated data analysis skills, joint-display development, and meta-interpretations of integrated quantitative and qualitative findings. This semester-long MMR data analysis project was intentionally built in to equip competencies beyond the MMR planning assessment (Poth, 2014) and aimed to build MMR implementation and dissemination capabilities. With this being the only MMR course offered at the study institution, the course design was labor-intensive for the instructor, yet very much appreciated by, and beneficial for, the students. This course was aimed not only at training students at the novice scholar level (focused on being good consumers of mixed methods research) but also at further equipping beginning MMR researchers with skills such as MMR integration and presenting and disseminating research (Guetterman et al., 2019; Guetterman, 2017).

Table 1 details the course topics and readings by week, the integrated teaching and learning activities, and the corresponding assignments to produce MMR competency outcomes.

DATA COLLECTION AND PARTICIPANTS

This study examined five cohort groups of doctoral students enrolled in the MMR course during 2016-2020 (n=54) on their MMR competency-based learning experience. Participants were second-year (full-time) or third-year (part-time) students in an interdisciplinary doctoral program in public affairs at a large public university in a southern U.S. state. All students had taken an advanced research methodology course, at least one statistics course, and one qualitative course prior to taking this MMR course. Figure 1 details a procedure diagram of the data collection and analysis of this MMR process evaluation with attention to key course design elements. Human subject approval of this study was received at the author's institution (IRB ID# STUDY00001672).

Table 1. MMR Course Topics, Assignment Activities, and Corresponding MMRCS-15 Performance Competency Measurement

Week	Topic	Readings	Assignment Activities	MMRCS_15 Measures
1	Course Overview / Introduction to Mixed Methods Research (MMR)	Creswell & Plano Clark – ch. 1-2	Homework (HW) #1 – Review MMR core features	MMRCS-1
2	Choosing a MMR Design – Overview	Creswell & Plano Clark – ch. 1-2 MMR project discussion HW#1 discussion	MMR case study assignment	MMRCS-2 MMRCS-3
3	MMR Core Designs Case Studies (A-C)	Creswell & Plano Clark – ch. 3 Appendices A-C	Come prepared to discuss assigned case studies	MMRCS-4 MMRCS-6
4	(MMR Project Consult) MMR Data Preparation	MMR project consultation MMR project literature review	Identify data variables of interest for MMR project development	MMRCS-1 MMRCS-2 MMRCS-9
5	Introduction of an MMR Study	Creswell & Plano Clark – ch. 5 MMR project discussion	HW #2 – Label core elements in Introduction	MMRCS-7 MMRCS-8 MMRCS-9
6	MMR Complex Designs – Case Studies (D-G)	Creswell & Plano Clark – ch. 4 Appendices D-G HW#2 discussion	Come prepared to discuss assigned case studies	MMRCS-5 MMRCS-6
7	MMR Progress Report (title, introduction with reference, purpose, research questions)	Project consultation & report feedback	Come prepared to present project progress report Mid-course feedback	MMRCS-14 MMRCS-15
8	MMR Design Diagram Work on MMR Project Introduction + Methodology	Creswell & Plano Clark – ch. 3 Hou & Fetters (2019) MMR case study – Chinese Women Cancer Screening Program (Hou, 2020) MMR articles	HW #3 – Draw MMR project design diagram	MMRCS-10
9	MMR Data Collection Project Discussion (1)	Creswell & Plano Clark – ch. 6 HW#3 discussion MMR project group discussion	HW #4 – MMR data analyses	MMRCS-11
10	Spring Break! No Class Withdrawal deadline	Work on MMR projects (Introduction + Methods; Section I, III – VII)		MMRCS-14
11	MMR Data Analyses & Interpretation Project Discussion (2)	Creswell & Plano Clark – ch. 7 Work on MMR data analyses HW#4 discussion		MMRCS-12
12	MMR Articles Review Project Discussion (3)	MMR article review Project consultation Work on MMR discussion	Complete MMR project data analyses & result tables draft for instructor feedback	MMRCS-12 MMRCS-15
13	Write an MMR Article Project Discussion (4) Re-cap / Team Work	Creswell & Plano Clark – ch. 8 Fetters & Freshwater (2015)	Identify MMR journal outlets	MMRCS-13 MMRCS-14
14	Advances in MMR Peer Review of MMR Project Manuscript	Creswell & Plano Clark – ch. 9 Recap & Q/A	Bring one copy of your manuscript draft for peer critique	MMRCS-15
15	MMR Project Manuscript (Oral) Report	NA	End course feedback	MMRCS-14 MMRCS-15
16	MMR Project (Written) Manuscript	Final MMR project manuscript Due @ 7pm	MMR final manuscript due End course reflections	MMRCS-14

MEASURES

Three data sources were used in the current process evaluation to capture the effectiveness of key course design elements and course experience: a mid-course feedback survey, an end-course feedback survey, and an end-of-course student perception of instruction evaluation survey, all with both quantitative and qualitative data.

Both the mid- and end-course feedback questions were researcher-created, with mid-course assessment aiming to highlight how students were learning and areas for improvement early on, and end-course assessment capturing the overall learning experience and impact.

Quantitative Measures

Quantitative ratings of each course element were sought in both the mid-course and end-course online anonymous feedback surveys. Students were asked, "How helpful was each of the following class elements in facilitating your learning on various MMR-related issues?" with a 5-point Likert scale ranging from very helpful (scored 5) to not helpful (scored 1). Key course elements measured included assigned readings, class lectures, class discussions and exercises, after-class homework assignments, MMR case studies, article reviews, peer critique of the MMR project, and the MMR project. The institutional central administrative office administered a separate end-course anonymous survey to assess student perception of instruction (SPI). The SPI survey included an overall effective question, also assessed via a 5-point Likert scale ("How would you rate the overall effectiveness of the instructor?") along with open comments.

Qualitative Measures

The mid-course open-ended qualitative items asked, "What are things you like about this course that you would suggest keeping?" and "What are things you think could be improved?"

End-course qualitative measures asked, "What were the course experiences that you identify as effective for developing MMR knowledge and skills? Please illustrate with examples if possible." Students were also asked to respond to the following statements: (1) It most helped my learning of the content when… because…; (2) The approach I took to my own learning that
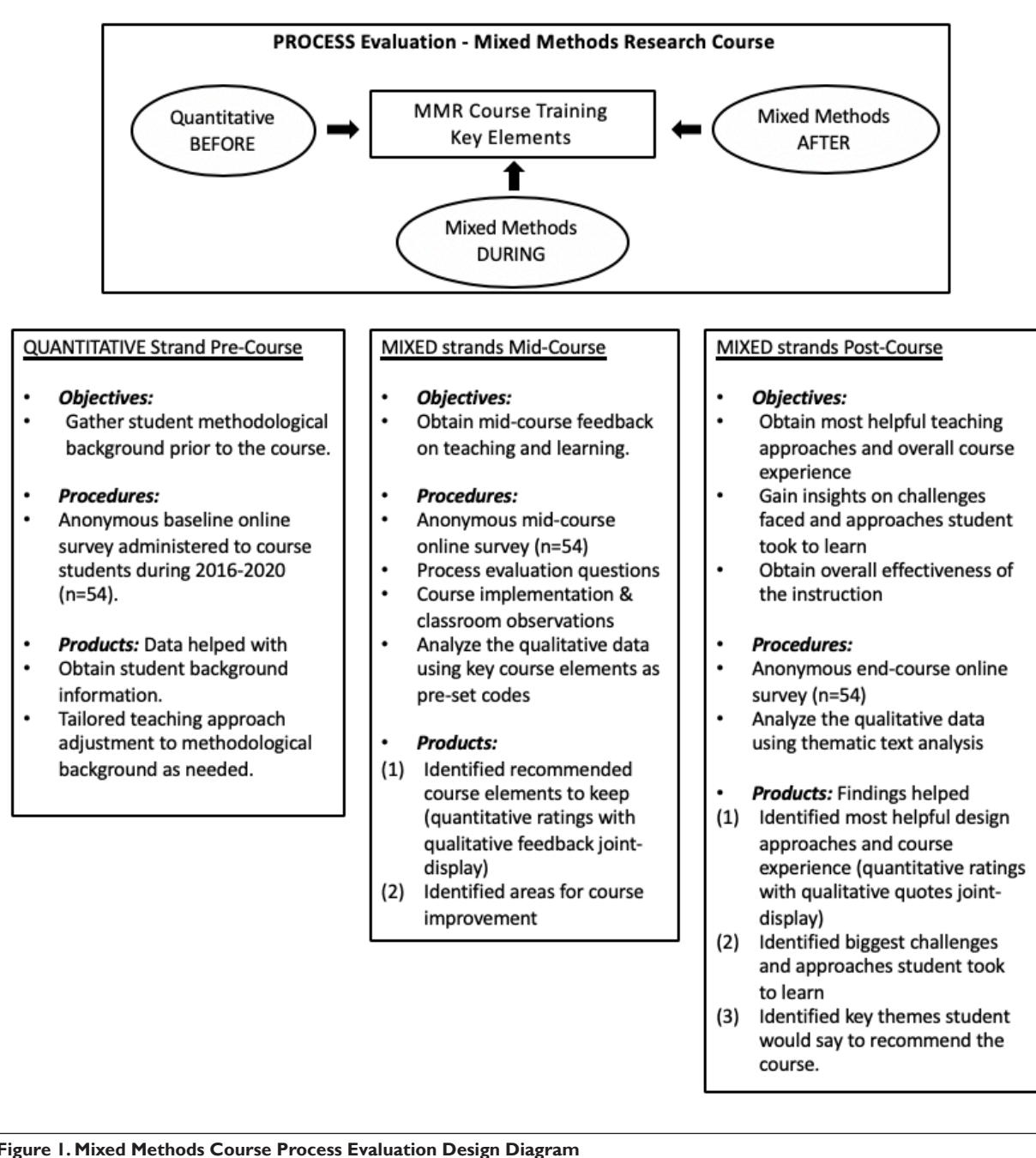
contributed the most for me was… because…; (3) The biggest obstacle for me in my learning the material was… because…; and (4) What would you say about the course and/or instructor if you would like to recommend it to other students?

DATA ANALYSIS

This is a qualitative-dominant mixed methods process evaluation study. Both mid-course feedback on things to keep and the end-course survey on the most helpful approaches and overall course experience were analyzed using course elements as pre-set codes. Text data were read with notes and memos on

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Figure 1. PROCESS Evaluation Design Diagram

PROCESS Evaluation - Mixed Methods Research Course

Quantitative BEFORE → MMR Course Training Key Elements ← Mixed Methods AFTER

Mixed Methods DURING

QUANTITATIVE Strand Pre-Course

- **Objectives:**
- Gather student methodological background prior to the course.

- **Procedures:**
- Anonymous baseline online survey administered to course students during 2016-2020 (n=54).

- **Products:** Data helped with
- Obtain student background information.
- Tailored teaching approach adjustment to methodological background as needed.

MIXED strands Mid-Course

- **Objectives:**
- Obtain mid-course feedback on teaching and learning.

- **Procedures:**
- Anonymous mid-course online survey (n=54)
- Process evaluation questions
- Course implementation & classroom observations
- Analyze the qualitative data using key course elements as pre-set codes

- **Products:**
(1) Identified recommended course elements to keep (quantitative ratings with qualitative feedback joint-display)
(2) Identified areas for course improvement

MIXED strands Post-Course

- **Objectives:**
- Obtain most helpful teaching approaches and overall course experience
- Gain insights on challenges faced and approaches student took to learn
- Obtain overall effectiveness of the instruction

- **Procedures:**
- Anonymous end-course online survey (n=54)
- Analyze the qualitative data using thematic text analysis

- **Products:** Findings helped
(1) Identified most helpful design approaches and course experience (quantitative ratings with qualitative quotes joint-display)
(2) Identified biggest challenges and approaches student took to learn
(3) Identified key themes student would say to recommend the course.

Figure 1. Mixed Methods Course Process Evaluation Design Diagram

students' feedback by key course elements. Qualitative data from the end-course survey on the biggest obstacles and approaches students took to learn, what to say about recommending the course to others, and other comments were analyzed via theme-based text analysis (Creswell, 2016) with an individual student as the unit of analysis. Thematic analyses were conducted to identify patterns to allow a flexible process to be adapted to the study purposes. The analyses followed the process of becoming familiar with the data by reading text data with notes and memos on students' learning experience and impact. Emerged codes were then grouped into meaningful themes (Guetterman et al., 2019; Creswell, 2016). The overall themes were identified and refined by analyzing and consolidating qualitative findings across data sources. Dedoose facilitated the qualitative analysis and quantifying of the codes generated (Dedoose Version 8.3.21, 2020).

Visual joint-display representations were created for the integrated findings analyses. Qualitative data on "course elements suggested to keep" from the mid-course survey were analyzed by pre-identified course elements with quantitative statistics and jointly displayed in Table 2. The qualitative themes of "(teaching) strategies that were most helpful in learning" and "effective course experience" from the end-course survey were combined and are jointly displayed with end-course quantitative course element ratings in Table 3. Themes on approaches students took to learn and recommend the course with code frequencies are presented in Tables 4 and 5. Finally, responses of "Any other comments" from the mid-course and end-course surveys, along with open comments from SPIs, were merged and presented in a word cloud

visual image (Figure 2). Descriptive statistics were generated from the most helpful course element on 5-point Likert scale ratings (mid- and end-course survey) and overall student perception of the instruction (university survey).

RESULTS
Teaching Approaches to Keep by Course Elements from Mid-Course Feedback
Quantitative data showed all course elements were helpful to very helpful, with means ranging from 4.38 to 4.67. Five cohort groups of qualitative comments from mid-course feedback were merged and coded based on the key course elements using the Dedoose Version 8.3.21 (2020) online software. A total of 69 text segments were coded. An additional code beyond the pre-identified course elements emerged and was labeled as the "instructor" factor, which included instructor guidance and mentoring, course design, learning environment, and pace. Code frequency counts showed the top five most frequently mentioned key "course elements to keep" were after-class assignments (19%), followed by instructor-design-environment-pace (17%), the overall MMR team project (15%), assigned readings (13%), and class lectures (10%). It should be noted that it was difficult to tease out which course element was most effective because of the integrated course design, which resulted in many students commenting "*Everything!*" Sample student quotes by key course elements, along with code frequencies and the quantitative 5-point Likert scale descriptive statistics on these key course elements are presented in the joint-display Table 2.

Table 2. Teaching Approaches to Keep by Course Elements (Mid-Course Feedback)		
Course Element a Mean (SD) b	Code Frequency (%)	Sample Quotes
Reading 4.62 (.490)	9 (13%)	Please continue to use the Creswell text, I truly like the textbook, very clearly outlined (ID#2, 8, 15, 16, 24, 28, 31).
Lecture 4.67 (.522)	7 (10%)	I liked that we spent the first few weeks discussing the similarities and differences in the types of designs of MMR. It was very beneficial to thoroughly understand them before beginning our proposal (ID#10). Keep the PowerPoint presentations explaining Creswell readings and in-class activities (ID#35, 36, 40).
Discussion / exercise 4.67 (.674)	6 (9%)	I love the interactive exercises and discussing homework assignments as they enable us to practice what we learn in class (ID#9, 12, 25). I like the discussion that matches the assignment so I can solidify what we covered (ID#20). Please continue to include the in-class activities and the after class assignments, it truly reinforces the learning and allows receiving feedback from our classmates and the professor on our understanding and application (ID#9, 15).
Homework 4.38 (.806)	13 (19%)	Everything! I love having the relevant homework to understand materials. It sounds weird but they are not busy work and they have a lot to do with our discussions (ID#7, 14, 26, 27). The after-session activities, and different homework are extremely helpful (ID#7, 26, 39).
MMR case studies 4.38 (.860)	4 (6%)	The case study and homework assignments are very good for driving home the concepts we learned in class (ID#38). The case study provides a great opportunity to apply MMR and receive feedback and instruction (ID#3, 16, 24).
Progress report 4.58 (.657)	5 (7%)	The progress report is helpful to keep students on track… I am not waiting until the last minute to complete everything… work on pieces at a time with continuous feedback from [the instructor] throughout… prevents procrastination! (ID#6, 13, 14, 26).
Article review 4.67 (.644)	3 (4%)	The critique of MMR studies undertaken by other researchers helps students understand this research method better (ID#41).
Team project – all 4.86 (.351)	10 (15%)	The "project focus" of the course is interesting and allow the skills we learn to be applied to actual research. I really like the fact that we are using real data and are working toward creating a publishable product (ID#3, 14). The interaction with the cohort group in learning how different disciplines interact in public affairs (ID#43). Everything! The directed research project, all of the activities are extremely useful to understand how to conduct MMR (ID#21, 23, 27, 30, 42).
Instructor-design-environ-pace	12 (17%)	1) The content of this course is super interesting and thought-provoking. 2) The assignments and the pace of this course is just perfect. 3) The instructor is super informative and helpful for any additional questions we may have (ID#5, 34). The professor is very engaging and encourages student participation… This course is helping me to become more comfortable speaking in front of groups (ID#10). Friendly learning environment, instructor great, the logic of course plan. Working with real mixed methods data, active learning, homework (ID#2, 18, 28, 29).
Total	69 (100%)	
a Both median and mode of all course elements were 5 out of 5.		
b Rated on 5-point Likert scale: (5) very helpful; (1) not helpful at all		

Most Helpful Course Experience by Integrated Course Elements from End-Course Survey

Quantitative data on key course elements assessed in the end-course survey showed a consistent very high rating with means ranging from 4.37 to 4.86. The overall "(teaching) strategies that were most helpful in learning" and "course experiences identified as effective" were combined for analysis. A total of 62 text segments were coded with four major integrated features/ themes identified. These features emerged with attention paid to re-grouping multiple pre-identified key course elements to provide practical guidance on integrated teaching approaches.

Four key features/themes emerged: (1) in-class discussions and activities (29%), which incorporated three course design elements: class lecture, discussion, and case studies; (2) outside class homework assignments and readings (31%), which incorporated three design elements: assigned readings, homework, and article review; (3) team project hands-on applications (29%), which incorporated three design elements: progress report, peer review, and overall team project; and (4) instructor effects (11%), which the student emphasized related to the instructor's lecture guidance and project consultations. Sample student comments corre-

sponding to these themes included: (1) "*We discussed and practiced concepts in class because it forced us to use our new found knowledge, it helps to break down the concepts and talk through the material to better understand it*"; (2) "*I really enjoyed the after-class assignment because it helped me actually apply the material discussed, reinforce what we had read and discussed and practiced immediately after lecture, It helps with integration*"; (3) "*The project helped me understand the class content, practice what we were learning, and write a full MMR research paper*"; and (4) "*The in-class lab-like activities truly encourage hands-on learning with the helpful oversight of the professor*" "*Her guidance was very helpful and shaped our MMR project.*"

The overall integrated course design was repeatedly shown to be helpful to students, as evidenced by student comments: "[the course was] *very integrated throughout and correspond[ed] to each other closely into a cohesive and integrated learning experience which facilitate[s] application to practice.*" Students commented, "*the final project and homework assignments were all very helpful… so were the case studies.*" And "*all assignments, to a great extent, helped me to develop knowledge and skills about MMR.*" Sample student quotes of the most helpful themes, along with code frequencies and the quantitative 5-point Likert scale descriptive statistics on key course elements, are detailed in the joint-display Table 3.

Table 3. Most Helpful Course Experience by Integrated Course Elements (End-Course Survey)		
Most Helpful Code Freq. (%)	Course Element a Mean (SD)	Sample Quotes
In-class discussions & activities 18 (29%)	Lecture: 4.65 (.482) Discussion: 4.77 (.427) Case study: 4.70 (.638)	[The instructor] used examples and let us guess what types of studies they were. I liked a LOT… (ID#42). When we had class discussions and homework assignments because I was better able to piece concepts together and check my own understanding… very helpful for building upon the knowledge gained (ID#38). We discussed practiced concepts in class because it forced us to use our new found knowledge, it helps to break down the concepts and talk through the material to better understand it… [the instructor] had us do exercises in class and after class, a little bit at a time. I learn so much better like that (little at a time) …active learning/ application, my preferred learning style (ID#1, 16, 27, 33, 36). When we learned from examples (e.g., textbook & research articles), because these literatures broaden our imagination and understanding… (ID#26, 35).
Outside class homework assignments & readings 19 (31%)	Reading: 4.63 (.536) HW: 4.63 (.655) Article review: 4.67 (.644)	Assigned homework, after-session, and all other assignments, because they gave us an opportunity to actually apply what we have learned in each section and furthered our understanding of MMR in each capacity (ID#4, 14, 23). I really enjoyed the after-session activities because it helped me actually apply the material discussed, reinforced what we had read and discussed and practiced immediately after lecture, It helps with integration… tested my knowledge and let me know what I needed to spend more time on (ID#5, 8, 10, 18, 20). We critically evaluated other MMR works. This allows us to get a better understanding of what quality MMR research looks like (ID#2, 35). The Creswell text was most helpful to understand MMR concepts and terminology (ID#6, 22).
Team project hands-on applications 18 (29%)	Progress report: 4.58 (.657) Project peer review: 4.37 (.874) Team project: 4.86 (.351)	Our group project because we had to work from start to finish and apply all MMR concepts, which although was challenging, helped me improve my skills. The project helped me understand the class content, practice what we were learning, & write a full MMR research paper (ID#11, 17, 28, 31, 32, 34, 37, 43). When we did peer critique because it always provided an opportunity to have other students' perspectives (ID#39). The progression of the term project was especially effective for my development of MMR knowledge and skills. The updates we had were very useful to link what we would have learnt what we are doing on the project (ID#38, 39). The final MMR paper as a continuation from program evaluation gave a lot of hand on experience in developing and executing a study (ID#35). The class project was very helpful allowing use of the homework assignments, such as the joint display to understand how to interpret mixed methods in our project (ID#37).
Instructor lecture, guidance, & project consultations 7 (11%)		When [the instructor] lectured because her slides were concise and very easy to understand (ID#35). I like [the instructor] always discussed the book chapters and provided examples when the chapters weren't clear (ID#8). The in-class lab-like activities truly encourage hands-on learning with the helpful oversight of the professor (ID#43). When [the instructor] introduced in-class learning/application activities. I'm a kinesthetic learner. Having the opportunity to do things in real time while being lectured is a great teaching methodology (ID#25). When [the instructor] met with each group and discussed the project. We were given time in class to meet with our partners for our final project in order to plan and discuss the next steps. Her guidance was very helpful and shaped our MMR project (ID#15, 18).
Total	62 (100%)	
a Rated on 5-point Likert scale: (5) very helpful; (1) not helpful at all Both median and mode of all course elements were 5		

Biggest Challenges and Approaches Taken to Learn from End-Course Survey

Theme-based text analysis of the biggest challenges faced generated 28 codes. The findings showed that the majority of the students showed NA or no challenges and were quite satisfied with the current course design (54%), while about one-third noted their own schedule or time management issues (32%). A small portion of the students (14%) indicated "*not having [a] strong qualitative or quantitative foundation*" before taking the MMR course and pointed out that the MMR integration part was challenging. Students commented that "*connecting various pieces of quantitative and qualitative data and design together*" was challenging because they had "*never approached the research from [the] MMR perspective*" or weren't "*sure which aspects to focus on.*" One student also commented on the challenges of the academic writing style, adjusting from a "*research essay*" to "*publishable research.*" Other students reported that the class was challenging but the instructor had eased all the obstacles.

Theme-based text analysis of students' own reported approaches that they took to learn revealed five major themes that emerged from 43 codes. These included: (1) self-study of textbook readings (23%); (2) reviewing MMR journal articles (23%); (3) applying concepts to the project with hands-on practice (21%); (4) reviewing and taking class notes (14%); and (5) reading before class to ask questions and contribute to discussions (19%). Sample student comments corresponding to these themes included: (1) "*Reading Creswell's chapters was super helpful… I spent about an hour after each class learning what was needed!*"; (2) "*Reading multiple MMR articles… to view how others have applied the concepts*"; (3) "*Listening to lecture and then applying the material to assignments… I love that this course integrated application in the form of assignments*"; (4) "*Comprehensive note taking during class as I absorb information faster that way*"; and (5) "*Reading and taking notes before class to follow the discussion better, and gave me an opportunity to ask the professor if I didn't quite understand something from the text.*" Sample student quotes by self-reported learning approach themes with code frequencies are detailed in Table 4.

'What Would You Say to Recommend This Course,' from End-Course Survey

Theme-based text analysis of what students would say about the course revealed three major themes that emerged from 30 codes. These included: (1) MMR values (37%); (2) the instructor factor (43%); and (3) course design (20%). Sample student comments corresponding to these thematic areas included: (1) "*The course was extremely helpful in familiarizing me with such a rich research method… clarifies what is an actual MMR study versus what many researchers claim to be MMR*"; (2) "*[The instructor] is amazing! She is knowledgeable, kind, cares about her field and students, and has a great sense of humor!!*" "*Her teaching methods are so impactful, and she makes the information so clear and easy-to-understand*"; and (3) "*This is, hands-down, the best methods course I have taken. I was able to learn at my own pace, to actually retain the information.*"

Student Perception of Instruction (SPI) Survey and Other Comments

The five cohorts (2016-2020) of SPI scores, administered by the institution on instruction effectiveness, were rated very high, with a mean (SD) of 4.91 (.288) out of 5 (n=54). Outcome evaluation of the overall course effectiveness and impact on student MMR competency outcomes measured by the 15-item researcher-created Mixed Methods Research Competency Scale (MMRCS_15) are detailed elsewhere.

Open-ended student perception of instruction (SPI) comments was combined with mid- and end-course "other comments" for world cloud analyses. Overall, students truly enjoyed the class and expressed heartfelt appreciation. Sample comments included:

> Love the class! Thank you for your clear and concise guidance. It's been a fun and informative semester. Feedback from you was helpful to really get my own feel for explaining mixed methods. Thank you for a great semester and the high-quality teaching! (#6, 18, 23, 25, 26, 27, 30, 36).

Table 4. Approaches Students Took to Learn (End-Course Survey).		
	Code Freq (%)	Sample Quotes
Self-study - textbook readings	10 (23%)	It was reading the Creswell book and other MMR articles because it helped me understand the concepts and reinforced what I was doing (ID#1, 4, 43). Self-study after class. I spent about an hour after each class learning what was needed! (ID#42). Reading Creswell's chapters from the book was super helpful. Great text selection for the course! (ID#22, 25, 26, 34).
Article reviews	10 (23%)	Reading multiple MMR articles because I was able to view how others have applied the concepts (ID#1, 12, 34, 38). Trying to find an exemplar article to model mine after. The article gave me a template to follow (ID#5, 32).
Applying concepts to project & hands-on practice	9 (21%)	Write the paper as I read the weekly readings, review MMR articles, AND writing a full MMR research paper (ID#11, 37). I learn best when I listen to lecture and then apply the material to an assignment (or practice what we just learned). I loved that this course integrated application in the form of homework assignments (ID#16, 18). It was hands-on and active throughout (ID#15). Learning how to approach quantizing qualitative data, though intimidating, it was really rewarding to see the end result (ID#10).
Class note-taking & reviewing	6 (14%)	Comprehensive note taking during class because I absorb information faster that way (ID#36). Reviewing the PowerPoints and matching the info to readings in the textbook (ID#33).
Read before class to better contribute to discussions	8 (19%)	Working ahead and staying connected with classmates (ID#1, 28). Reading and taking notes before class to better follow the discussion and gave me an opportunity to ask the professor if I didn't quite understand the text (ID#1, 6, 8, 14, 24). Working within deadlines kept the information fresh and reinforced the material! (ID#23).
Total	43 (100%)	Pretty satisfied, the textbook has done an excellent job introducing MMR clearly, and the course has been programmed very well.

I've really enjoyed this course, including the assignments, discussions, and atmosphere. I truly appreciate the opportunity to check in each week on our final projects to ensure we are on track. You are incredibly supportive and encouraging and gave autonomy to create "our own study." Thank you so much for teaching us MMR! (#1, 22, 26, 38, 39).

Thank you for making it fun to go to class and having a safe environment to ask questions and challenge ideas. You provide very clear instructions. I really enjoy your very well-structured course! Thank you for an amazing semester! (#10, 11, 14, 20, 33).

This was a terrific class! It sparked my interest in MMR. Thank you very, very much for everything you have taught us. I am really honored to be your student. I really hope we will stay in touch forever. I am grateful to my life that it has introduced me to you (#2, 7, 32, 34, 35).

DISCUSSION

Study results highlighted, from students' voices and perspectives on key course elements, four integrated themes regarding the most helpful teaching approaches. The findings also pointed out the biggest challenges and five approaches to learn from students' perspectives, key themes students noted to recommend the course, and overall student perception of instruction and other insightful comments. Also, the findings provided concrete course design elements and integrated assignment activity details inside and outside the classroom, with rich qualitative quotes from students.

Mixed methods process evaluation and the embedded mid- and end-course assessment by the instructor, as well as student perception of instruction by institutional staff, provided robust data sources through which to gain a greater understanding and nuanced picture of the integrative course design to teach MMR. Current findings jointly provided strong convergent evidence for the key integrated course design elements and impact on student learning. Quantitative-only assessment would lose the rich context and learning process derived from students' voices, while qualitative-only assessment could not capture the consistent high quantitative ratings on key course design elements and perceptions of instruction. This study pulls in the strength of quantitative and qualitative strands of data, and various data sources with information collected mid- and end-course and assessed across five cohort groups of doctoral students over time.

We should note that the incremental and integrated design of the course was key to enabling students to better digest the complex concepts of MMR and learn how to explain to others what was learned (Hou & Pereira, 2017; Hou, 2009). The opportunities to apply what was learned in each class session have been a powerful way to help students ingrain core concepts in their brains. Applying MMR procedures could be challenging at times, yet I strived to provide instructive and clear guidance while facilitating a relaxed and constructive learning environment. This helps ensure that students not only get their own feel for explaining MMR but also enjoy their active learning experience. I also provided step-by-step guidance with ample examples from real-life case studies. Students truly appreciated such a "learning-by-doing" approach to practicing hands-on data analysis and quality scholarly writing skills through the MMR course.

The impact that the instructor might have on students' learning experience should be noted. The pre-identified course elements included in the study were more tangible, concrete activities. Yet, both the mid- and end-course qualitative data revealed the critical role that the course instructor played in making the integrated design and learning experience even more impactful. Over the years, I have witnessed how the integration of intentional coursework, activities, and assignments plays a critical role in students' active learning and skills building. Students appreciated the continuous feedback provided throughout the assignments and progress reports. Interactive in-class activities and mini-after class assignments were carefully integrated to reinforce learning.

Current faculty members who have the background and training to teach MMR are scarce, and except for a small proportion of early-career faculty who might have taken an MMR course, most are the "first generation of faculty" who have taught themselves MMR (Creswell, Tashakkori, Jensen, & Shapley, 2003). Designing and implementing an effective MMR doctoral-level course requires dedicated and substantial instructor efforts and preparations. There must also be additional support for faculty-level instructors and scholars to receive advanced MMR training or participate in workshops, as many did not have formal graduate education training in modern MMR because of its recent emerging development (Poth et al., 2020; Poth, 2014).

This mixed methods process evaluation is limited to its single group assessment. It would have been helpful to compare this integrated design to a standard teaching approach without a hands-on data analysis project. The current findings recommend that attention be paid to the "instructor factor" in future studies that conduct a process evaluation of MMR courses. In addition, the findings call attention to the need to consider students' research training background, as many were exposed to mixed methods for the first time. It might be helpful to consider providing outside class resources to strengthen students' qualitative and quantitative foundations. Also, MMR faculty and instructors should consider spending more time on building "integration" skills with hands-on data-based project practice (e.g., specific scenarios and different ways to integrate data). Finally, explicitly providing study tips that students identified as assisting in learning could be helpful.

The current study provides practical guidance and a powerful impact from the integrated course design with real-life hands-on project-based learning for faculty and instructors who teach MMR. The study also provides a robust yet easy-to-use mixed methods tool for process evaluation to capture effective course design elements and the student learning experience.

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