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Araştırma Makalesi

EVALUATION OF A RESEARCH METHODS COURSE IN DIGITAL AND HYBRID LEARNING ENVIRONMENTS: AN ACTION RESEARCH STUDY*

Emine YAVUZ**

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Abstract

Developing a research-based culture in education requires preservice teachers to acquire strong research competencies through effective research methods instruction. This study examines how a research methods course can be taught more effectively to preservice teachers through a student-centered approach in digital and hybrid environments. Designed as an action research study, it was conducted across three semesters with 14, 27, and 32 participants, respectively. Data were collected through open-ended questions via Padlet and researcher field notes and analyzed using content analysis. Findings revealed that student-centered and interactive teaching practices, continuous feedback, and the use of diverse examples were perceived as the most effective aspects of the course. However, preservice teachers consistently reported challenges related to content density, the high number of topics, and difficulties in understanding key concepts across all cycles. Despite iterative revisions, these challenges persisted, suggesting that some difficulties may be inherent to research methods education. The findings are discussed in terms of course content, instructional processes, and evaluation practices.

Keywords: Research methods course, action research, student-centered learning, blended learning, preservice teachers.

DİJİTAL VE HİBRİT ÖĞRENME ORTAMLARINDA ARAŞTIRMA YÖNTEMLERİ DERSİNİN DEĞERLENDİRİLMESİ: BİR EYLEM ARAŞTIRMASI

Öz

Eğitimde araştırma temelli bir kültürün geliştirilmesi, öğretmen adaylarının araştırma becerilerini etkili bir şekilde kazanmalarını gerektirmektedir. Bu çalışma, araştırma yöntemleri dersinin öğretmen adaylarına dijital ve hibrit ortamlarda daha etkili nasıl öğretilebileceğini incelemektedir. Eylem araştırması olarak tasarlanan çalışma, üç dönem boyunca sırasıyla 14, 27 ve 32 öğretmen adayıyla yürütülmüştür. Veriler, Padlet aracılığıyla toplanan açık uçlu sorular ve araştırmacının saha notlarıyla elde edilmiş, içerik analiziyle analiz edilmiştir. Bulgular, öğrenci merkezli ve etkileşimli öğretim uygulamalarının, sürekli geri bildirimin ve çeşitli örneklerin kullanımının dersin en etkili yönleri olarak algılandığını

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** Dr. Öğr. Üyesi; Erciyes Üniversitesi Eğitim Bilimleri Bölümü, emineyavuz@erciyes.edu.tr, ROR ID: 047g8vk19.

göstermiştir. Bununla birlikte, öğretmen adayları içerik yoğunluğu, konu sayısının fazlalığı ve temel kavramların anlaşılmasındaki güçlükleri tüm döngülerde tutarlı biçimde dile getirmiştir. Yapılan revizyonlara rağmen bu durumun devam etmesi, bazı güçlüklerin dersin doğasından kaynaklanabileceğini göstermektedir. Bulgular içerik, öğretim süreci ve değerlendirme uygulamaları bağlamında tartışılmıştır.

Anahtar Sözcükler: Araştırma yöntemleri dersi, eylem araştırması, öğrenci merkezli öğrenme, hibrit öğrenme, öğretmen adayları.

Introduction

The tremendous increase in the rate of advancement of information and communication technologies has necessitated the development of skills to thrive in the 21st century. In this context, the world of learning and teaching is expected to be creative, innovative, and sustainable. A research-based culture must be adopted to create an innovative and sustainable learning and teaching environment. Based on this idea, this study focuses on how the research methods course can be taught more efficiently to preservice teachers who will play an active role in adopting and sustaining the research-based culture in the world of learning and teaching. Through the course, preservice teachers are expected not only to enhance their own learning but also to improve their students' education by applying their research skills in their profession. In line with the research-based learning perspective, actively engaging preservice teachers in the research process is considered essential for developing inquiry-oriented and reflective practitioners (Fung, 2017; Healey et al., 2014).

Studies on research methods education (RME) are categorized into three main areas. The first category focuses on the scope, content, and objectives of RME (e.g., Matos et al., 2023b; Schweizer et al., 2011). The second category is the teaching methods through which it can be covered (e.g., Class, 2023; Pfeffer & Rogalin, 2012); the third category is reviewing studies in the literature (e.g., Earley, 2014; Matos et al., 2023a). In the current study, which falls within the scope of the second research category, we focused on applying the active learning perspective and research-based teaching method suggested by the RME literature. Consistent with student-centered learning approaches, this perspective emphasizes learners' active participation, autonomy, and engagement in authentic research tasks rather than the passive transmission of methodological knowledge (Prince & Felder, 2006).

While in the studies in the literature, it was carried out on an online platform or face-to-face, in the current study, RME was carried out online and hybrid (online and face-to-face at the same time). The current study offers a distinct perspective on the literature regarding the hybrid processing of RME. Recent higher education literature conceptualizes hybrid and blended learning environments not merely as a combination of online and face-to-face modes, but as pedagogical designs that intentionally integrate digital and physical learning spaces to enhance flexibility, interaction, and access to learning resources (Beatty, 2019; Graham & Halverson, 2022, pp.1-4). Additionally, the hybrid method employed in this study is supported by online storage and learning and teaching platforms. In this respect, the study offers instructors and researchers a different perspective on utilizing digital platforms to support student-centered and research-based approaches in RME.

To the best of our knowledge, there is limited empirical research focusing explicitly on the formative assessment methods that can be used in RME. In the literature, this education is predominantly evaluated based on assignments submitted at the end of the semester (Earley, 2014). In response to this limitation, the current study fills this gap in the relevant literature by providing readers with an example of both formative and summative approaches to evaluating RME. Additionally, to the researchers' knowledge, explicitly documented and publicly accessible course syllabi for RME are rarely reported in the literature. This causes difficulties for instructors who will conduct RME for the first time. Presenting the course syllabus in this study will provide instructors who will be teaching this course for the first time with a concrete and practice-oriented idea about how to execute it. Finally, RME literature focuses primarily on graduate education, with relatively limited studies available for undergraduate students. This study presents a distinct example within the existing literature by focusing on RME for undergraduate students. Accordingly, the primary contribution of this study is to present a practice-oriented example of how research methods education can be iteratively designed, implemented, and evaluated in digital and hybrid learning environments.

1.1. Research Method Education

With the Bologna process, universities began updating the courses they offer (Matos et al., 2023a). With the understanding of this process and the importance of research-based culture, research methods education has begun to be taught as a compulsory course at the undergraduate level in many universities (Council of Higher Education [CHE], 2018). In line with international trends emphasizing inquiry-oriented and evidence-informed teaching, RME is increasingly positioned as a foundational component of teacher education programs (Garner et al., 2016, pp. 1-3). With the updated higher education programs in Turkey in 2018, the content of this course has been further detailed. In the current version of the program, the scope of RME consists of the following topics (CHE, 2018):

> Basic concepts and principles of research methods; research process (recognizing the problem, determining the problem and sample, data collection and analysis, interpreting the results); general features of data collection tools; analysis and evaluation of data; access to articles, theses, and databases; research models and types; basic paradigms in scientific research; quantitative and qualitative research designs; sampling, data collection, data analysis in qualitative research; validity and safety in qualitative research; reviewing, evaluating and presenting articles or thesis; preparing a research report in accordance with research principles and ethics; action research in education. (CHE, 2018)

This comprehensive scope reflects the expectation that preservice teachers develop not only technical methodological knowledge but also the capacity to critically evaluate research and engage in systematic inquiry within their professional practice, which aligns with research-based and student-centered approaches to RME (Healey et al., 2014; Prince & Felder, 2006).

While the current study is designed as an action research process involving iterative cycles of planning, implementation, and revision, it is analytically structured using a program evaluation perspective. In this study, the CIPP model serves as the primary evaluation framework guiding the systematic examination of each cycle. The CIPP model (Stufflebeam & Shinkfield, 2007, pp. 325-344) conceptualizes evaluation as a systematic process that addresses four dimensions, context, input, process, and product, for informed decision-making and program improvement. The model has been widely used in higher education due to its

suitability for iterative course development (Zhang et al., 2011). In the current study, context evaluation examined participants' needs and expectations prior to implementation, input evaluation focused on course design, including instructional strategies, content, and materials, process evaluation addressed the quality of implementation and student experiences across cycles, and product evaluation examined the perceived effectiveness and overall value of the course.

Within this framework, evaluation was conducted using a formative-summative approach. Prior to the first implementation, context and input evaluations were informed by a review of the relevant literature and the researcher's expertise, in line with Scriven's (1991, pp. 168-169) distinction. Participant feedback collected after the first two implementations was used formatively to refine the program, while data from the third implementation served a summative purpose. Such an approach aligns with contemporary views of continuous improvement in higher education, where evaluation is integrated into the instructional process rather than limited to end-of-course judgments (Wiliam, 2018, p. 48). In this sense, formative evaluation informed the revisions made between action research cycles, while summative evaluation provided an overall assessment of the effectiveness of the final implementation. Furthermore, the study is informed by responsive and utilization-focused evaluation approaches, which emphasize participants' experiences as a legitimate source of evidence and the practical use of evaluation findings. These approaches are not treated as independent frameworks but as complementary perspectives that support the interpretation of findings within the CIPP-based evaluation structure.

1.2. Purpose of the Study

The teaching method and evaluation of the course, which is planned to be taught for two hours per week, is left to the instructor. In this context, we focused on conducting RME by adopting an individualized, adaptable, and flexible approach that emphasized the development of research skills and active student engagement throughout the research process. Based on this framework, the study aims to examine how a research methods course can be iteratively designed, implemented, and evaluated in a student-centered and hybrid learning environment. To address this aim, the study is guided by the following research questions:

- How do preservice teachers evaluate the research methods course in terms of its strengths, challenges, and areas for improvement throughout the implementation process?

2. Method

2.1. Research Model

In the current study, we conducted action research to examine how the educational research methods course could be designed more effectively for undergraduates. Action research was selected as a classroom-based practitioner inquiry model, allowing iterative improvement of instructional practices within an authentic educational setting. Action research is defined as a systematic and reflective inquiry aimed at improving practice through planned action and evaluation (Mills, 2013, pp. 8-16; Fraenkel & Wallen, 2006, pp. 5 67-568). In this study, the action research process was structured around iterative cycles, each consisting of

problem identification, action planning, implementation, observation, reflection, and redesign (Yavuz, 2023, pp. 86-96).

The process was carried out across three consecutive cycles corresponding to three semesters, enabling the continuous refinement of the course design. In the first cycle, initial problems related to course content, instructional practices, and assessment were identified based on student feedback and field notes. These findings informed the development of an action plan for the subsequent cycle. In the second cycle, the planned revisions were implemented, and the process was systematically observed through data collection tools. The outcomes of this cycle were evaluated to identify persisting and emerging issues, which informed further modifications. In the third cycle, the revised course design was implemented again, and the process was evaluated to assess the overall effectiveness of the changes made across cycles. Thus, each cycle built upon the previous one through a continuous process of evaluation and redesign. Within this iterative process, evaluation was conducted using a CIPP-based framework, allowing systematic examination of the context, design, implementation, and outcomes of each cycle.

2.2. Participants

The research was conducted over three semesters with second-year undergraduate preservice teachers. Participants consisted of volunteer preservice teachers enrolled in the specified course. In this context, the study employed convenience sampling, which enables researchers to collect data from participants who are readily accessible and available (Fraenkel & Wallen, 2006). The research included 14 preservice teachers from social studies education during the spring semester of 2020-2021, 27 from science education during the fall semester of 2021-2022, and 32 from social studies education during the spring semester of 2021-2022.

2.3. Data Collection Tool

This study triangulated data using two qualitative data sources: researchers' field notes and an open-ended online questionnaire, aiming to enhance the credibility of the findings through methodological triangulation. Researcher field notes were recorded systematically during each semester, and more specifically after each instructional session, focusing on instructional flow, participant engagement, and observed challenges. These notes were guided by an observational focus including student participation patterns, difficulties in understanding course content, and classroom interaction processes.

An open-ended questionnaire administered via Padlet was used as a data collection tool across three consecutive semesters to capture preservice teachers' perceptions of the course. While Padlet keeps preservice teachers' identities anonymous, it allows them to view all responses submitted on the platform. This feature was intentionally used to support reflection and idea generation by allowing participants to reconsider their own views in light of their peers' responses, which has been shown to promote richer qualitative data (Fuchs, 2014). However, it should also be noted that this feature may have led to convergence effects or social influence, as participants could be affected by previously shared responses. Accordingly, Padlet was used as a tool to collect reflective feedback, while its potential influence on responses was taken into consideration in interpreting the findings.

The open-ended questions were designed to capture participants' overall evaluations of the course rather than to probe deeply into specific dimensions such as effectiveness, student-centeredness, or hybrid learning. While this broad structure allowed participants to freely express their views, it may have limited the depth of responses in certain areas. The questionnaire prompted participants to reflect on the course content, instructional methods, and assessment practices and included the following open-ended questions:

• What are the positive aspects of the course, if any?

• What are the negative aspects of the course, if any?

• What aspects, if any, of the course could be improved?

• How can the course be taught better?

Ethics committee approval was obtained from Erciyes University, Social and Human Sciences Ethics Committee (Date: 19.02.2022, Number: 13/57). Informed consent has been obtained from the participants.

2.4. Research Design

2.4.1. Course objectives and content

An academic semester in Türkiye typically spans 17 weeks, with four weeks allocated to university-wide assessment activities. The first week is dedicated to acquainting preservice teachers with the course content, performance tasks, and evaluation procedures. In contrast, the final week is devoted to reviewing the key topics covered throughout the semester. During the remaining 11 instructional weeks, the course content was organized in accordance with the curriculum prepared by the CHE (2018) and included the following topics:

• Ethics in scientific research. Reporting of the research proposal and report,

• Fundamentals of scientific research,

• Identifying the research problem I-II,

• Sampling methods,

• Data collection I-II,

• Quantitative research I-II,

• Qualitative research,

• Mixed research and data analysis.

The topic of data analysis was addressed at an introductory level, with an emphasis on identifying appropriate analysis techniques for different research problems rather than on procedural depth. Although multiple instructional components (e.g., course content, examples, delivery mode, and assessment practices) were implemented, these were treated as interconnected elements of a holistic course design rather than as independent interventions. Therefore, the study did not aim to isolate the individual effects of specific components, but rather to improve the overall instructional process. These adjustments were implemented iteratively across action research cycles based on student feedback and classroom observations. For example, whereas the development of survey instruments was discussed in detail during the

first two semesters, this topic was addressed more briefly in the third semester in order to allocate additional time to applied examples and discussion. This revision was made in response to students' difficulties in understanding abstract concepts and their need for more concrete examples. To provide a clearer representation of the iterative changes made throughout the study, Table 1 summarizes the key revisions implemented across action research cycles.

Within the scope of these topics, by the end of the semester, preservice teachers were expected to be familiar with the basic concepts of scientific research, educational research methods, population and sampling procedures, and data collection tools. In addition, they were expected to acquire research ethics awareness, skills in critiquing scientific studies, and foundational competencies in designing educational research.

Table 1: Summary of Revisions Across Action Research Cycles

Cycle	Identified Issues	Revisions Implemented	Rationale
Cycle 1	Too many topics, difficulty understanding	Reduced content detail, increased examples	To improve comprehension
Cycle 2	Continued difficulty, need for flexibility	Hybrid delivery, additional examples	To enhance engagement and accessibility
Cycle 3	Persistent conceptual difficulty	Further emphasis on examples and discussion	To support deeper understanding

2.4.2. Educational Situations (Teaching Methods)

The instructional design incorporated multiple components (e.g., teaching methods, materials, delivery modes, and digital tools), which were implemented as interconnected elements of a student-centered learning environment rather than as isolated instructional strategies. We designed educational situations using an active learning approach, incorporating question-and-answer techniques and a research-based teaching method. In this framework, preservice teachers were encouraged to actively engage with course content through discussion, analysis of research examples, and reflective questioning. Since we shared the course syllabus with preservice teachers at the beginning of the semester, we wanted them to prepare for the course. However, when preservice teachers came to class without prior preparation, we used the direct teaching method as a supportive strategy to ensure continuity of instruction.

As course materials, we used articles and theses that employed various types of research within the scope of the preservice teachers' majors, as well as books and slides that summarized the subject for preservice teachers. Sometimes, we opened these publications in class and read the relevant sections together, at other times, we asked the preservice teachers to read and review the relevant sections or publications independently. This flexible use of materials aimed to strike a balance between guided instruction and independent learning. Each lesson began with a brief review of the previous lesson using the question-and-answer technique and ended with a summary of the material taught that day.

All lectures were taught in two 35-minute sessions because a university-wide precautionary decision was made due to COVID-19. The first-semester courses were conducted through the Zoom platform, while the second- and third-semester courses were delivered concurrently, both online and in-person, utilizing the Zoom program. This hybrid implementation allowed preservice teachers to participate either face-to-face or remotely while following the same instructional flow. We video-recorded the lessons in all three semesters and shared them with the preservice teachers through the university's allocated repository.

While the overall student-centered teaching approach remained consistent across semesters, minor adaptations were made in response to classroom dynamics and student needs, particularly through the increased use of relevant examples in the third semester. Moreover, we utilized the university's online course management system to share course materials and necessary announcements. Preservice teachers asked their questions and communicated with the instructor using this online course management system, via email, or by visiting the instructor's office during face-to-face training periods. These adaptations were informed by observations and student feedback obtained throughout the implementation process.

2.4.3. Assessment

In the assessment and evaluation components of the RME, both summative and formative approaches were adopted. To be considered successful in the course, preservice teachers were required to take two exams consisting of mixed-type items in the middle and at the end of the semester, complete various performance tasks, and revise selected tasks based on formative feedback provided by the researcher. A weighted average of at least 50 points at the end of the semester was required to pass the course.

Two scores, the midterm and final scores, were entered into the university's course information system. The weighted passing score was calculated by assigning 40% weight to the midterm score and 60% weight to the final score. Students with an average of 50 points or above were considered successful. The midterm score consisted of 50% of the first exam and 50% of the points obtained from the first ten performance tasks, while the final score was comprised of 40% of the second exam, 50% of the final performance task (HW11), and 10% active participation in the course.

The performance tasks were grouped into two categories based on the cognitive processes expected from preservice teachers: (a) examining a published thesis or article using predetermined criteria and (b) establishing research designs, both brief and extended, based on the research models addressed during the course. There were 14 performance tasks in the first semester and 11 performance tasks in the second and third semesters. Table 2 presents the content of the performance tasks implemented in the last two semesters.

Preservice teachers were asked to determine an article or thesis in advance with the instructor and examine the same publication across multiple assignments (HW2, HW3, HW4, HW9, and HW10), each focusing on different sections of the study aligned with the weekly course content. This design aimed to support cumulative learning and deeper engagement with a single research study over time. The final version of the course syllabus is presented in the appendix. While the overall assessment framework was maintained across semesters, certain elements, such as the number of assignments, were adjusted in response to student feedback.

Table 2: The Contents of the Performance Tasks

Assignment No	Content
	Examining a published thesis or article
HW 2	Examining the section from the introduction to the method section of a publication according to the criteria.
HW 3	Examining the population and sample or research group or participants in the method section of the publication according to the criteria.
HW 4	Examining the data collection tools and/or data collection process in the method section of the publication according to the criteria
HW 9	Examining the research model in the method section of the publication according to the criteria.
HW 10	Examining the data analysis in the method section of the publication according to the criteria.
	Establishing research designs, both brief and lengthy
HW 1	Writing a scientific research problem in the field of preservice teachers.
HW 5	Preparing a short research draft regarding one of the surveys, correlational, or single-case research in the preservice teachers' major.
HW 6	Preparing a short research draft regarding one of the causal comparison, experimental design, or meta-analysis research in the preservice teachers' major.
HW 7- HW 8	Preparing a short research draft regarding one of the action, case, narrative, or phenomenology research in the preservice teachers' major.
HW 11	Preparing a short research proposal in the preservice teachers' major.

HW: Homework. NOTE: Each assignment from HW1 to HW10 will be evaluated out of 10 points, HW11 out of 100 points. Those who do not complete their homework on time will receive 0 points for that homework.

2.5. Data Analysis

We employed content analysis on the data, as it was collected through open-ended questions asked of preservice teachers and the researchers' field notes. Content analysis, whether inductive or deductive, is a qualitative data analysis method used to identify recurring words, themes, or concepts within qualitative data, thereby explaining a given phenomenon (Vaismoradi et al., 2013). In the current study, the analysis primarily followed an inductive approach, allowing themes to emerge from participants' responses and observational records. The coding process was conducted in several stages. First, all responses and field notes were read multiple times to achieve data familiarization. Initial codes were then generated inductively from meaningful units within the data. These codes were compared and grouped based on similarities and differences, leading to the formation of broader categories. Subsequently, overarching themes were developed by organizing these categories in relation to the research questions. The data obtained from open-ended questionnaires and field notes were analyzed concurrently. During this process, codes derived from both data sources were compared and integrated to ensure consistency and to enrich the emerging categories and themes. This integration allowed for triangulation and contributed to a more comprehensive understanding of the phenomenon under investigation.

After the researcher completed the initial coding process, a measurement expert independently re-coded the data to ensure coding reliability. Intercoder reliability was calculated using the formula proposed by Miles and Huberman (1994, p. 64): agreement / (agreement + disagreement). The intercoder reliability coefficients were 0.96 for the first semester, 0.93 for the second semester, and 0.90 for the third semester, indicating a high level of agreement between coders. In cases of disagreement, the coders discussed the differences and reached a consensus through iterative review. According to Miles and Huberman (1994), coding is considered reliable when the agreement coefficient exceeds 0.70. Therefore, the coding process in this study was deemed reliable.

3. Results

In all three semesters, it was optional for preservice teachers to respond to the data survey items. Therefore, not all items were answered by an equal number of preservice teachers. This resulted in varying response frequencies across themes, which were taken into account during interpretation. Table 3 presents the results of the content analysis of preservice teachers' opinions about the course at the end of the first semester.

Table 3: Preservice Teachers' Opinions about the Course in 2020-2021 Spring

Category	Codes	n	Category	Codes	n
Theme 1. Positive aspects of the course					
Educational Situation	Student-centered teaching	2	Assessment	Giving feedback on assignments	4
	Interactive processing of the lesson	1		Feedback during the lesson	3
	Ensuring permanent learning through frequent practice	1	What the course brings to the student	Teaching how to do research	2
	High-motivated lecturer	6		Teaching the characteristics of a researcher	1
	Openness to the communication of the lecturer	4		Teaching academic and general knowledge	1
	Lecturer's friendliness	2		Preparing for graduate education	1
	Professionalism of lecturer	1			
	Lecturer coming to class prepared	1			
	Giving frequent examples	1			
	Frequent application	1			
Theme 2: Negative aspects of the course					
Course content	Having too many topics, subtopics, and terms	6	Preservice teachers' attitude	Anxiety about the exam being difficult	1
	It is difficult to make sense of the topics	4		Not everyone actively participates in the lesson	1
Educational Situation	Insufficient resource usage	6		People's prejudiced approach to the lesson	1
Assessment	Having too much homework	1			
Theme 3: Aspects of the course that can be improved					
Course content	Reduction of topics	1	Assessment	Reducing assignments	2
	More superficial treatment of topics	1		Narrowing the scope of assignments	1
Educational Situation	Increasing the examples given in the course	4		Make exams easier	2
Theme 4: How can the course be taught better?					
Course content	Topics reduced	2	Assessment	Reducing assignments	4
Educational Situation	Face to face	7		By taking quizzes between classes	2
	By processing more slowly	2		Explaining the assignments in more detail	1
	Giving more examples	1			
	Active participation is encouraged more	1			

As can be seen in Table 3, preservice teachers frequently mentioned the positive aspects of the course, including the researcher's motivation, openness to communication, and provision of feedback during the semester. These views are also reflected in participant statements such as "Hocamızın bizlere dönütler vererek değerli hissettirmesi güzeldi" and "Hocamızın ilk günden son güne kadar anlayışlı olması, bıkmadan usanmadan anlatmaya ve geri dönüş vermeye devam etmesi". In addition, the use of examples and applications during lessons was appreciated, as one participant noted, "Hocamızın anlattığı konuyu örnekler ve uygulamalarla desteklemesi dersi anlaşılmasını kolaylaştırıyor." On the other hand, preservice teachers also reported several negative aspects of the course. These mainly included the high number and density of topics and concepts, as well as the intensity of assignments. For example, one preservice teacher stated, "Konular çok fazla ve işledikçe birbirine karıştı çoğu zaman. Haftalık ödev olması da bazen çok sıkıcı oldu." Similarly, another preservice teacher stated, "Çok fazla kavram var ve bu dersi ilk defa aldığımız için kavramları öğrenmekte zorluk çekiyoruz." Despite the provision of examples during the lesson (e.g., "Derste konu anlatılırken örnekler verilmesi anlamamız açısından güzeldi"), some pre-service teachers perceived the number of examples as insufficient. Furthermore, Table 3 shows that preservice teachers believe the course will be taught more effectively if it is conducted face-to-face, with ample examples and fewer homework assignments. This is evident in statements such as "yüz yüze anlatılsa veya konular daha yavaş geçilse daha iyi işlenmiş olurdu" and "Ödevler daha az olmalıydı." Consistent with the action research framework, these findings were used to inform instructional revisions in the subsequent cycle. Following these findings, we taught the next semester's course simultaneously in both face-to-face and online formats, in compliance with the university-wide COVID-19 precautions. These findings led to a reduction in the number of assignments and an increased emphasis on examples in the subsequent cycle. Table 4 presents the results of the content analysis of preservice teachers' opinions about the course following the second semester.

Table 4: Preservice Teachers' Opinions about the Course in 2021-2022 Fall

Category	Codes	n		Codes	n
Theme 1: Positive aspects of the course					
Educational Situation	Using the question-answer technique	7	Course content	Conceptual understanding (non-memorization-based learning)	1
	Giving frequent examples	6	Assessment	Giving assignments	4
	Interactive processing of the lesson	2	What the course brings to the student	Preparing for graduate education	6
	Sharing the training and evaluation process with preservice teachers in advance	1		Teaching academic and general knowledge	5
	Sharing course materials with preservice teachers quickly after the lesson	1		Teaching how to do research	2
	Openness to the communication of the lecturer	2		Developing research skills	1
	Professionalism of lecturer	1			
Theme 2: Negative aspects of the course					
Course content	Based mostly on verbal information	3	Educational Situation	Making direct explanations	3
	It is difficult to make sense of the topics	14		Students being passive in class	1

	Having too many topics, subtopics, and terms	7			
Theme 3: Aspects of the course that can be improved					
Educational Situation	The information in slides can be increased	15	Assessment	Reducing assignments	3
	Examples can be more detailed and concrete	4		Explaining the assignments in more detail	3
	More examples can be given	3		One of the evaluation types can be selected	1
	Course materials can be improved	1			
	Participation in class can be increased	1			
	The lesson can be taught more slowly	1			
	A less direct explanation is possible	1			
Theme 4: How can the lesson be taught better?					
Educational Situation	More examples can be examined together in class	8	Course content	Topics reduced	1
	Giving more examples	4	Assessment	Explaining the assignments in more detail	4
	Increasing in-class practices	1			
	The information in slides can be increased	1			
	Active participation is encouraged more	1			
	Using more online platforms to increase classroom interaction	1			
	Ensuring more active participation by using different teaching methods	1			
	Learning through data collection, note-taking, and sharing	1			

As seen in Table 4, preservice teachers highlighted the frequent use of the question–answer technique and the inclusion of ample examples. These views are reflected in statements such as “Dersi soru-cevap şeklinde geçirmek konuyu kavramamızı sağladı” and “Ders içerisinde soru ve cevap üzerinden ilerlememiz … anlaşılırlığı olumlu yönde etkileyen en önemli faktördü.” They also emphasized that the course contributed to their preparation for graduate studies, as one participant noted, *“*Yaptığımız ödevler sayesinde … nasıl araştırma yapılacağını öğrendik ve yüksek lisans düşünenler için ön hazırlık oldu.” The use of examples was also perceived as supportive for learning, for instance, *“*Örnek vererek konu anlatıldığı için … öğrenmemiz kolaylaştı.” On the other hand, preservice teachers also reported several negative aspects of the course, particularly the intensity and complexity of the content. For example, participants stated, “Dersin içerik bakımında çok yoğun olduğunu düşünüyorum” and “Konular çok ağır ve ayrıntı çok fazla.” Similarly, difficulties in comprehension were emphasized, as reflected in statements such as “Bu konu hakkında daha önceden bilgilerimiz olmadığı için dersi kavramakta zorlandım.” In addition, although examples were generally considered beneficial, some preservice teachers perceived them as insufficient, noting that “Örnekler çoğaltılabilir ve daha çok açıklamalar olabilir.”

Table 4 further indicates that preservice teachers believe the course will be taught more effectively if the slides used in the course are prepared in greater detail, if the course is supplemented with numerous examples, or if the assignments are reviewed in more detail during classroom sessions. For instance, participants suggested that "Slaytlarda daha fazla bilgi verilebilirdi." These findings guided further refinements in the third implementation cycle. These findings informed instructional revisions in the third semester, including adjustments in content coverage, increased use of examples, and greater emphasis on the examination of research publications in class. Despite these revisions, similar challenges, particularly related to content density and difficulty in understanding, continued to be expressed by preservice teachers in the second cycle. At the same time, preservice teachers' increased emphasis on examples and clarity suggests that the revisions implemented after the first cycle contributed to improvements in instructional delivery, even though some conceptual challenges remained. Table 5 presents the results of the content analysis of preservice teachers' opinions about the course at the end of the last semester.

Table 5: Preservice Teachers' Opinions about the Course in 2021-2022 Spring

Category	Codes	n	Category	Codes	n
Theme 1: Positive aspects of the course					
Educational Situation	Clear and fluent instruction	9	Assessment	Giving assignments	2
	Teaching method	3	What the course brings to the student	Preparing for graduate education	5
	Giving feedback	1		Teaching academic and general knowledge	11
	High-motivated lecturer	1		Developing research skills	1
	Openness to the communication of the lecturer	1			
Theme 2: Negative aspects of the course					
Course content	Having too many topics, subtopics, and terms	2 3	Educational Situation	Giving few examples	1
	It isn't easy to make sense of the topics	9	Assessment	Giving too much homework	6
	Some numerical data is confusing.			Comprehensiveness of assignments	5
	Overall comprehensiveness	3		Few examples of homework	1
Theme 3: Aspects of the course that can be improved					
Educational Situation	Examples can be more detailed and concrete	9	Assessment	Reducing assignments	4
	The lesson can be taught more slowly	2		Explaining the assignments in more detail	1
	Topics can be reduced	2			
	Lesson hours can be increased	2			
	Participation in class can be increased	1			
	Different teaching methods can be used	1			
	The information in slides can be increased	1			
Theme 4: How can the lesson be taught better?					
Educational Situation	More examples can be examined together in class	4	Course content	Topics reduced	2
	Giving more examples	1 4	Assessment	By reducing the number of assignments	1
	The information in slides can be increased	3		By increasing the time allocated for homework	1
	By processing more slowly	2		Evaluated through an assignment to be completed by the end of the semester	1

Topics should be treated more superficially	2
Giving more examples from daily life	1
Course duration may be extended	1

As seen in Table 5, preservice teachers stated that the course was enjoyable, that it prepared them for a master's degree, and that it provided them with knowledge on many subjects, which they considered positive aspects of the course. These views are reflected in statements such as "Dersimiz eğlenceli geçiyor" and "Neşeli ve güzel bir ortamda geçiyor." In addition, preservice teachers emphasized the course's contribution to research skills and graduate preparation, as one participant noted, "Nasıl araştırma yapmamız gerektiğini öğrendim," and another stated, "Yüksek lisans temeli için biçilmiş kaftan olan bir ders." The use of examples was also appreciated, as reflected in the statement "Derste konu anlatılırken örnekler vererek anlatılması anlamamız açısından güzeldi." On the other hand, preservice teachers reported several negative aspects of the course, particularly the excessive number of topics, concepts, and terms, as well as difficulties in comprehension. For example, participants stated, "Aşırı fazla kavram olduğu için akılda tutulmuyor" and "Çok fazla kavram var ve biz bu dersi ilk defa aldığımız için kavramları öğrenmekte zorluk çekiyoruz." Similarly, the intensity of assignments and content was perceived as challenging, as one participant noted, "Ödevler çok fazla ve her hafta var, bu bizi fazlaca sıktı." In addition, although examples were found useful, some preservice teachers emphasized that they were insufficient, suggesting that "Örnekler arttırılabilirdi" and "Slaytlarda örnekler daha fazla olabilir."

Table 5 further shows that preservice teachers believe the course would be improved if the topics or assignments were reduced or if ample examples were provided in the course. This is evident in statements such as "Konular azaltılabilir, bu kadar yoğun olmayabilir" and "Örnekler artırılabilir." This continuity of similar concerns across all three cycles indicates that the issue persisted despite iterative revisions in the instructional process. Nevertheless, the increased frequency of positive statements related to instructional clarity and usefulness indicates a progressive improvement in the overall instructional process across cycles. To provide a clearer overview of the iterative process across action research cycles, a summary of key findings, revisions, and outcomes is presented in Table 6.

Overall, Table 6 demonstrates a gradual enhancement of instructional quality across cycles through iterative refinements, alongside some continuing challenges related to the complexity of the course content.

Table 6: Summary of Action Research Cycles

Cycle	Key Findings (Problems)	Revisions Implemented	Outcome in Next Cycle
Cycle 1	Need for clearer explanations, challenges in comprehending complex and abstract concepts, and a preference for face-to-face instruction	Increased use of examples, reduced number of assignments, and adjustments in content load, in a hybrid learning environment	Improved engagement and interaction, but some conceptual challenges remained
Cycle 2	Continued need for concrete examples, detailed presentation, and examination of the research articles	Enhanced instructional materials, increased in-class examples, discussions, and examinations	Better clarity in instruction, ongoing difficulty with abstract concepts
Cycle 3	Persistent high number of concepts and terms, difficulty in comprehension, heavy workload (assignments), and need for more examples and simplification	Further emphasis on examples, discussion, and pacing	Increased enjoyment and perceived usefulness (e.g., contribution to research skills and graduate preparation). However, challenges related to conceptual density and terminology persisted
Overall	Consistent emphasis on examples, clarity, and manageable content	Iterative refinement of instructional strategies	Progressive improvement in instructional quality with some recurring challenges

4. Discussion

As the importance of doing research has increased gradually in the 21st century, it has been acknowledged that this skill should be taught to younger generations. Therefore, teachers who guide students in acquiring this skill are expected to possess it. In response to the need for teachers equipped with this skill, the CHE in Turkey has added a Scientific Research Methods course to the curriculum of education faculties. This policy-level decision aligns with international trends that emphasize research-based and inquiry-oriented teacher education (Healey et al., 2014, pp. 14-16; Garner et al., 2016, pp. 1-4). In this study, we focused on conducting RME more effectively for preservice teachers for three semesters. In this context, we conducted research method education online and in a hybrid format, based on active learning and research-based teaching methods, which are widely recognized as practical approaches for developing research competence and inquiry skills in undergraduate education (Garner et al., 2016, pp. 1-2; Healey et al., 2014; Prince et al., 2020). By integrating instructional design, implementation, and evaluation within an action research framework, processing and evaluating RME using different methods, and sharing the course syllabus in this study, the research extends the existing RME literature by providing a practice-oriented and iterative example at the undergraduate level.

4.1. Discussion of RME Context

There are many opinions in the literature about the purpose of RME. For example, Lei (2010) defines the purpose of RME as ensuring that students acquire research skills and become familiar with their application. Barraket (2005) describes it as improving cognitive and practical research design and management skills. Both definitions emphasize the importance of helping students understand the nature of research and acquire the necessary skills. More recent literature similarly conceptualizes RME as a means of fostering inquiry competence, critical thinking, and research literacy, particularly in undergraduate education (Garner et al., 2016, pp. 1-6; Matos et al., 2023b). Sharing this standard view, CHE (1999) integrated RME into university education systems as a course for undergraduate students. Within the framework released by CHE, we determined the purpose and content of RME addressed in the current

research. To summarize, the purpose of RME in this study is to ensure that preservice teachers are familiar with research methods, understand and critique previous research and its findings, and design research using these methods. Accordingly, the effectiveness of the RME in this study is conceptualized in terms of participants' perceived usefulness, instructional value, and implementation quality, rather than in terms of causal learning outcomes. This aligns with process-oriented and developmental approaches to program evaluation (Patton, 2008). From a context and product evaluation perspective within the CIPP framework, these findings reflect participants' perceptions of the overall value and outcomes of the course.

According to the current research results, preservice teachers found the course topics and details to be too numerous and difficult to comprehend. In response, the content of RME was streamlined in the third semester by reducing subject detail, but similar criticisms persisted. This finding aligns with the existing literature, which consistently highlights the inherent complexity of research methods and the challenges students face due to the abstract and technical nature of the content (Braguglia & Jackson, 2012; Earley, 2014; Matos et al., 2023a). In addition, it has been noted that students' lack of preparation further exacerbates these difficulties (Matos et al., 2023a). Consistent with this, both preservice teachers' statements and the researchers' field notes in the present study indicated that some participants attended classes without adequate preparation, which may partially explain the persistence of these challenges. Similar patterns have also been reported in recent studies, particularly regarding students' difficulties with the quantitative and data-intensive components of RME (Garner et al., 2016, p. 5). In the present study, disciplinary differences further shaped these experiences: A social studies preservice teacher reported difficulty understanding numerical data, whereas a science preservice teacher indicated challenges due to the predominantly verbal nature of the instruction. Such variations may be explained by differences in disciplinary backgrounds, as prior research suggests that students' academic fields influence their approaches to learning, conceptual understanding, and engagement with different types of content (Biglan, 1973; Neumann et al., 2002). Accordingly, some of the patterns observed across cycles may reflect these disciplinary characteristics rather than being solely attributable to instructional design. Matos et al. (2023a) similarly report that learners of research methods often hold negative perceptions, particularly toward statistical and quantitative aspects.

While similar challenges in research methods education have been widely reported in the literature (Braguglia & Jackson, 2012; Earley, 2014; Matos et al., 2023a), it is important to note that much of this literature is based on descriptive or experimental designs that document these difficulties rather than systematically addressing them through iterative intervention. In contrast, the present study adopts an action research framework that emphasizes continuous refinement and context-sensitive instructional improvement. From this perspective, the persistence of such challenges does not indicate a limitation of the research design, but rather reflects the complex and resistant nature of learning research methods (Kemmis et al., 2014, pp. 86-89; McNiff, 2013, pp. 7-90). Accordingly, action research in this context functions not necessarily to eliminate all challenges, but to progressively improve instructional practices and to better understand the conditions under which these challenges emerge. This interpretation is also consistent with evaluation approaches that emphasize responsive and utilization-focused perspectives, where participants' experiences are considered a primary source of evidence for program improvement, as well as with CIPP-based evaluation models that support iterative

refinement in complex educational contexts (Stake, 2004, pp. 86-88; Stufflebeam & Zhang, 2017, pp. 94-95; Zhang et al., 2011).

4.2. Discussion of RME's Teaching Method

From a process evaluation perspective within the CIPP framework, the teaching methods adopted in the study can be interpreted in terms of how the instructional process was experienced and evaluated by participants. Summarizing the teaching methods adopted for research methods education in the literature into six categories is possible (Earley, 2014). These categories are (1) cooperative learning (see Jiao et al., 2011), (2) problem-based learning (see Braguglia & Jackson, 2012), (3) active learning (see Polkinghorne & Wilton, 2010), (4) service learning (see Keyton, 2001), (5) technology-supported teaching (see Class, 2023), and (6) experiential or learning-by-doing approaches (see Strangman & Knowles, 2012). Using research-based and learner-centered methodologies, we adopted an active student-centered learning process (Pfeffer & Rogalin, 2012) in the current study. This preference aligns with contemporary RME literature, which emphasizes active engagement and inquiry-based learning as central to developing research competence, particularly at the undergraduate level (Garner et al., 2016, pp. 2-6; Prince et al., 2020). Also, we supported preservice teachers' learning using digital platforms.

Throughout the three semesters, preservice teachers stated that they liked the teaching method of the course. Their active participation in the course increased with the use of the question–and–answer technique and feedback, resulting in increased perceived learning and engagement rather than directly measured learning outcomes. In fact, the literature states that ensuring the active participation of learners in RME and engaging them in research design activities are necessary and effective ways to support understanding of the nature of research methods (Bell, 2016; Earley, 2014; Matos et al., 2023a). Recent studies further suggest that dialogic interaction and continuous feedback enhance students' engagement and epistemic understanding in research-oriented courses (Carless & Winstone, 2020; Prince et al., 2020). In addition to the question–answer technique and feedback, preservice teachers stated that the researcher's openness to communication, friendliness, and field expertise made the lesson more enjoyable and understandable, thus supporting their perceived learning. These statements underscore the importance of an engaging and knowledgeable instructor, a supportive classroom climate, and a structured yet flexible course design to effectively implement an active, student-centered learning process (Bell, 2016).

Preservice teachers stated that the number of examples used in class was limited across the three semesters, although we increased the number of in-class examples after the first semester. They suggested that relevant sections of research publications be examined collectively following topic discussions to support more meaningful and efficient learning. Additionally, preservice teachers reported that the slides used to explain the flow of the topics were insufficient. Similar expectations regarding the use of concrete examples and scaffolded materials have been reported in recent RME studies, which highlight the importance of guided exemplification for reducing cognitive load in complex methodological content (Matos et al., 2023a). Despite these statements, we did not revise the slides, as we explicitly communicated to preservice teachers at the beginning of the semester that the presentations were intended solely to outline the structure and progression of topics rather than to replace in-depth engagement with primary sources.

Finally, the course was conducted online during the first semester, and at the end of that semester, most preservice teachers expressed a preference for face-to-face instruction. Accordingly, the course was implemented in a hybrid format during the second and third semesters. According to the researchers' field notes, the hybrid approach was perceived to enable preservice teachers to exercise greater control over their learning processes. Preservice teachers who could not attend classes in person were able to participate synchronously via Zoom, while those who missed sessions could review recorded lessons as needed. Additionally, an online course management system was used throughout all three semesters. According to the researchers' field notes, this system appeared to facilitate communication, feedback exchange, access to materials, and monitoring of course progression. These findings are consistent with more recent research on blended and hybrid learning, which suggests that flexible access to instructional resources and recorded content supports learner autonomy and continuity of learning (Beatty, 2019; Graham & Halverson, 2022, p. 2). These observations also align with the findings of Campbell et al. (2008), who reported comparable learning outcomes between online and face-to-face RME groups when digital platforms were used to support instruction.

4.3. Discussion of RME's Assessment

From an input and process evaluation perspective within the CIPP framework**,** the assessment practices can be understood as both part of the instructional design and the evaluation of learning. Literature supports the idea that preservice teachers require a structured framework to acquire research skills related to conducting and designing studies, as well as interpreting and understanding research findings (Matos et al., 2023a). Contemporary research further emphasizes that such frameworks should integrate continuous feedback and formative assessment to support learning in complex methodological domains (Carless & Winstone, 2020; Wiliam, 2018, pp. 48-52). Based on this idea, we used formal formative assessment (through structured assignments), informal formative assessment (through in-class feedback and interaction), and summative assessment (test) together to evaluate the RME course. We conducted an informal formative assessment (Ruiz-Primo, 2011) in the course, which does not require any preparation, occurs during learning, and requires feedback to shape students' learning (Akbaş et al., 2026). This approach aligns with current formative assessment perspectives that conceptualize feedback as an integral component of the learning process rather than a separate evaluative activity (Wiliam, 2018, pp. 48-52). Preservice teachers stated at the end of the semester that their learning was perceived to increase with informal formative assessment.

For formative assessment, we designed assignments that required preservice teachers to apply what they had learned in their major field of study. While some assignments required preservice teachers to evaluate a study published in their major according to specific criteria, others involved designing both short-term and long-term research projects in their major and reporting on their designs. In this study, assignments functioned both as instructional tools supporting learning and as assessment tools evaluating student performance, reflecting their dual pedagogical role. Such task designs are consistent with research highlighting the role of authentic, discipline-specific assignments in fostering research literacy and methodological understanding (James et al., 2016, pp. 139-149; Wagner et al., 2011). In the current study, some preservice teachers argued that assignments helped them understand the course, and others criticized the number of assignments. At the end of the first semester, considering the

statements of the preservice teachers, we made no changes to the content of the assignments but reduced their number. However, at the end of the second and third semesters, they stated that reducing the number of homework assignments would help reduce the difficulty of the course. This tension between the depth of engagement and perceived workload has also been noted in prior RME studies, suggesting the need for a careful balance of assignment quantity and cognitive demand (Matos et al., 2023a). In future studies, the course may be conducted with fewer assignments.

For summative assessment, we prepared two mixed exams for preservice teachers, one administered midway through the semester and the other at the end of the semester. In these exams, we evaluated the information not included in the assignments but thought necessary for preservice teachers within the revised Bloom's taxonomy (Krathwohl, 2002), focusing on the cognitive processes of knowledge, comprehension, and application. Some preservice teachers stated that the exams were difficult because they covered comprehension and application levels. Some preservice teachers suggested that evaluating the course solely through exams or assignments would be more effective. This finding reflects an ongoing debate in the assessment literature regarding the most appropriate methods for evaluating research knowledge and skills, particularly in practice-oriented courses (Carless & Winstone, 2020; Wiliam, 2018, pp. 48-52). However, the optimal balance between assessment through "doing" and traditional testing remains unclear. While some types of knowledge may be more effectively assessed through quizzes and tests, this issue remains a topic of debate in the RME literature (Earley, 2014). In fact, some preservice teachers stated that it would be better to assess the course with quizzes at the end of each unit, suggesting that hybrid assessment models, which combine formative, summative, and low-stakes testing, warrant further investigation.

5. Conclusion and Recommendations

In conclusion, the findings of this study suggest that the course program benefited from an iterative evaluation and refinement process informed by student feedback and researcher field notes. Across the second and third implementation cycles, revisions were made to the course content, instructional approach, and assessment practices, albeit to a limited extent for instructional methods, based on participants' experiences and observed implementation dynamics. The third implementation can be considered the most refined version of the course rather than a finalized version, as some challenges (e.g., content density and need for more examples) persisted according to participant feedback. Participants consistently reported both strengths (e.g., student-centered practices, feedback, and examples) and challenges (e.g., content overload and conceptual difficulty), indicating that while improvements were observed, some issues remained unresolved. Overall, the findings highlight that iterative revisions contributed to improved clarity and engagement from the participants' perspective, but did not fully eliminate the inherent challenges of research methods education.

The present study has some limitations. One of these limitations is related to the scope of RME. Although the literature indicates an increased interest in research methods among students who are actively involved in the data collection process (Senter, 2017), this component was not included in the current course design due to time constraints and the one-semester structure of the RME course. Recent studies have similarly noted that while experiential data collection enhances engagement, it is often challenging to implement within the limited instructional time available at the undergraduate level (Wagner et al., 2011) limitation is related

to course duration. We taught all lectures in two 35-minute sessions because a university-wide precautionary decision was made due to COVID-19. The time problem caused by the shortening of course durations is also reflected in the current study's findings. Therefore, it is recommended that instructors and researchers conduct this course over more extended instructional periods or with increased weekly contact hours to allow deeper engagement with complex methodological content. In addition, the inclusion of participants from different disciplinary backgrounds across cycles may have influenced their perceptions of the course, which should be considered when interpreting the findings. Furthermore, the study relies primarily on self-reported data and researcher field notes, which may limit the objectivity of the findings. In addition, although Padlet supported reflection by allowing participants to view each other's responses, this feature may have introduced convergence effects or social influence, which should be considered when interpreting the findings. Another limitation is the absence of direct performance-based data (e.g., exam scores or objective achievement measures) in the main analysis, which limits the ability to draw conclusions about actual learning outcomes. Finally, it should be noted that, in line with the nature of action research, the instructor played an active role in shaping instructional and assessment processes, allowing for context-sensitive and iterative improvements. However, this feature may also limit the generalizability of the findings to different instructional contexts.

In a methodological domain that is already challenging, the educational research environment is often characterized by tensions between teaching research procedures and supporting students' learning processes. In the RME course implemented in the current study, which adopted the question–answer technique and active learning from a student-centered perspective, a few preservice teachers expressed dissatisfaction. In contrast, many others supported the teaching method. This divergence reflects a typical pattern reported in RME literature, indicating that student-centered and inquiry-based approaches may be perceived as demanding despite their pedagogical benefits (Matos et al., 2023a; Prince et al., 2020). It is therefore recommended that instructors who conduct RME design their courses with an awareness of this tension and provide appropriate scaffolding to support learners with varying levels of preparedness.

In the literature, studies examining the content, teaching methods, and evaluation of RME have often relied on the perspectives of instructors and experts (Earley, 2014). Unlike these studies, the current research aimed to determine the content, teaching methods, and evaluation approaches for effective RME by incorporating the perspectives of preservice teachers alongside researchers' field notes. Future studies could extend this approach by integrating additional data sources, such as exam scores, course performance indicators, or longitudinal follow-up data, to triangulate perceived effectiveness with learning outcomes. Such mixed evidence could further strengthen the empirical basis for evaluating RME designs and contribute to a more comprehensive understanding of practical research methods instruction at the undergraduate level.

Declarations

Funding / Supporting Institutions: No external funding was received for this study.

Ethical Approval and Participant Consent: This research was approved by the Ethics Committee of Erciyes University, Faculty of Social and Human Sciences, with decision number 13/57, taken at its meeting on February 19, 2022.

Plagiarism Statement: This article has been scanned with plagiarism detection software. No plagiarism was detected.

Data and Materials Availability: The data supporting the findings of this study are available within the article and its references.

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Appendix

RESEARCH METHODS COURSE SYLLABUS

Course Information :	
Course Supervisor :	
E-mail:	
Phone :	
Office :	
Office day :	
Course Day and Time:	
Course Objectives	This course aims to gain knowledge and skills related to research methods in the field of education.
Course Description	• Basic concepts and principles of research methods; • Research process (recognizing the problem, determining the problem and sample, data collection, interpreting the results); • General characteristics of data collection tools; • Analysis and evaluation of data; • Access to articles, theses and databases; • Research models and types; • Basic paradigms in scientific research; • Quantitative and qualitative research designs; • Sampling, data collection, and data analysis in quantitative and qualitative research; • Validity and reliability in quantitative and qualitative research; • Article or thesis review, evaluation, and presentation. • Preparing a research report using research principles and ethics. • Action research in education.
Learning Outcomes	• Student knows research methods in education. • Student knows sampling methods. • Student knows data collection tools. • Student examines a scientific publication. • Student evaluates and reports a publication according to the specified criteria.

	• Students design a scientific research plan.
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Evaluation process	***Midterm score*** • Midterm exam consisting of mixed items (multiple choice + true/false + open-ended + matching) (50%) • Sum of the HomeWorks (HW1-HW10) (50%) ***Final score*** • Final exam consisting of mixed items (multiple choice + true/false + open-ended + matching) (40%) • Research proposal submitted at the end of the semester (50%) • Class participation (10%)

WEEKLY PLANNING

Weeks	Course Content	Student tasks before and during the class	Student task after class
1. Week	Introduction of the course, information about the objectives, content, process, evaluation methods, and resources	---	---
2. Week	Ethics in scientific research. How is reporting done? Where and how to conduct research?	Preparation on the related subject, in-class discussions	---
3. Week	Basics of scientific research	Preparation on the related subject, in-class discussions	---
4. Week	Problem defining	Preparation on the related subject, in-class discussions	HW 1
5. Week	Problem defining	Preparation on the related subject, in-class discussions	HW 2
6. Week	Sampling methods	Preparation on the related subject, in-class discussions	HW 3
7. Week	Midterm exam	---	---
8. Week	Data collection I (basic concepts, questionnaire, scale)	Preparation on the related subject, in-class discussions	---
9. Week	Data collection II (test, observation, interview)	Preparation on the related subject, in-class discussions	HW 4
10. Week	Quantitative research I (basics of quantitative research, survey, correlational, single case)	Preparation on the related subject, in-class discussions	HW 5
11. Week	Quantitative research II (causal comparison, experimental, Meta-Analysis)	Preparation on the related subject, in-class discussions	HW 6
12. Week	Qualitative research I (basics of qualitative research, action study, case study, narrative study)	Preparation on the related subject, in-class discussions	HW 7 HW 8
13. Week	Mixed research, Data analysis (correlation, regression, t-test, ANOVA, descriptive, content analysis, etc.)	Preparation on the related subject, in-class discussions	HW 9 HW 10
14. Week	General overview of the topics	Preparation on the related subject, in-class discussions	---
15. Week	Final exam	Preparation for the exam	---