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INTERDISCIPLINARY PROBLEM SOLVING IN EDUCATION: A SYSTEMATIC MAPPING STUDY WITH A FOCUS ON THE TURKISH SCIENTIFIC CONTEXT

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Abstract. This study systematically maps research on interdisciplinary problem solving in education, with a primary focus on the Turkish scientific context. International studies are included to provide contextual comparison and to position national research trends within the broader literature. The study aims to identify the structural characteristics of the field, reveal prevailing research tendencies, and determine existing gaps. Within this framework, 35 postgraduate theses and 9 related articles published between 2015 and 2023 were analyzed in terms of publication year, academic level, research method, study group, associated disciplines, and thematic focus. The findings indicate that theses were published frequently in 2018 and 2019, while articles peaked in 2020, reflecting a period of intensified academic and institutional scholarly interest. Master's theses constitute the majority of graduate research, whereas doctoral studies remain limited in number, scope, and theoretical contribution. Mixed methods were predominantly used in theses, while quantitative designs were more common in articles, indicating restricted methodological diversity and a comparatively limited use of qualitative approaches. Middle school students were the most frequently studied group, whereas teachers, parents, and other stakeholders were included to a limited extent. Disciplinary distribution is concentrated in science, mathematics, and engineering, largely influenced by STEM and STEAM approaches, while social sciences and arts remain underrepresented. Although interest in the field has increased over time, methodological and disciplinary balance has not yet been achieved, and theoretical consolidation remains limited. The study emphasizes the need to diversify research designs and broaden participant profiles.

Keywords*:* ınterdisciplinary problem solving, systematic mapping, educational research, research trends, pedagogical approaches, methodological diversity.

1. INTRODUCTION

The problems encountered in daily life often require a problem-solving approach that integrates knowledge from multiple disciplines. For example, obesity is a multidimensional problem involving various disciplines: the chemical composition of food relates to science, nutritional value to mathematics, physical activity to sports, and mental health to psychology. Addressing such problems from a single disciplinary perspective may be insufficient to develop effective solutions. Yıldırım (1996) emphasized that due to the complex nature of problems, integrating knowledge from multiple disciplines is essential for effective problem resolution. From this perspective, the importance of interdisciplinary problem solving has increased in contemporary contexts. Fields such as healthcare, urban planning, digital technologies, robot design, and artificial intelligence-based applications are outcomes of interdisciplinary problem-solving practices. In interdisciplinary contexts, problem solving

is guided by the principles of relevance and timeliness (Kuhn, 2003).

Problem solving can be defined as the process of developing solutions for complex situations by combining knowledge and expertise from different disciplines. Researchers' approaches to problem solving vary depending on their theoretical perspectives and areas of expertise. A review of the literature reveals different models describing the problem-solving process. For instance, Dewey (1910) described the process as consisting of five steps: recognizing and defining the problem, generating solutions, applying solutions, and evaluating outcomes. Polya (1973) proposed four stages: understanding the problem, devising a plan, executing the plan, and reviewing the results. Bransford and Stein (1984) introduced a model including problem identification, exploring possible solutions, implementing them, and evaluating outcomes. Mayer (1985) defined the process as translating the problem, integrating information, planning, and executing the plan. Bingham (1998) proposed a more detailed sequence involving defining the problem, collecting data, organizing information, determining solutions, evaluating alternatives, implementing solutions, and assessing results. Although these models emphasize different aspects of problem solving, interdisciplinary problem-solving skills enable individuals to examine problems from multiple disciplinary perspectives.

Interdisciplinary problem solving combines problem-based learning and interdisciplinary learning approaches (Şahin & Kabapınar, 2020). It is defined as a cognitive process required to resolve a problem or achieve a specific goal (Bingham, 1998; Mayer, 1985). Interdisciplinary approaches integrate content, methods, concepts, and theories from multiple disciplines (NRC, 2005; Wagner et al., 2011). This integration facilitates the meaningful development of cognitive, affective, and psychomotor skills. Effective problem solving requires an interdisciplinary perspective that enables individuals to combine their knowledge, skills, and competencies to generate sustainable solutions.

Approaching problems through multiple disciplinary lenses fosters creativity, critical thinking, and holistic understanding. Interdisciplinary collaboration encourages knowledge exchange, innovation, and the development of communication and entrepreneurial skills (Klein, 2021; Klein & Falk-Krzesinski, 2017; O'Rourke et al., 2013). Given its individual and societal significance, interdisciplinary problem solving has been incorporated into national and international educational frameworks. For example, the European Qualifications Framework defines key competencies such as communication in native and foreign languages, mathematical competence, scientific and technological competence, and digital competence. These competencies aim to cultivate individuals capable of interdisciplinary communication and addressing complex scientific and social challenges (European Commission, 2019). The Turkish Qualifications Framework is aligned with the European Qualifications Framework (Official Gazette, 2015). Educational approaches such as STEM, STEAM, E-STEM, and GEMS can be considered practical implementations of interdisciplinary problem-solving education.

A review of the literature indicates that numerous studies have focused on interdisciplinary approaches (Aytar & Özsevgeç, 2019; Cervetti et al., 2012; Convertini, 2021; Çelik & Buluç, 2018; Dolapçıoğlu & Bolat, 2020; Durmuş & Alpkaya, 2019; Karali, 2021; Kali, 2024; Niyozova, 2023; Özçelik & Semerci, 2016; Županec et al., 2023). Overall, these studies demonstrate that interdisciplinary practices have been implemented across various educational levels, from preschool to primary and middle school. However, most applications appear to be designed within a hierarchical framework in which one subject is positioned at the center, while other disciplines assume supportive or complementary roles. This suggests that the balanced interaction and epistemological integration theoretically envisioned by interdisciplinary approaches have not yet been fully achieved.

Studied research papers consistently show that findings focusing on problem solving (Araiza-Alba et al., 2021; Caliskan, 2020; Castro, 2023; Ulu, Başaran & Erol, 2023; Gültekin & Altun, 2022; Ichsan et al., Subroto, Dewi, Ulimaz & Arief, 2023; Khalid et al., Saad, Hamid, Abdullah, Ibrahim & Shahrill, 2020; Sholihah & Lastariwati, 2020; Ummah & Yuliati, 2020; Van Hooijdonk et al., 2023; Yayuk & As'ari, 2020) have predominantly examined the concept within the context of academic achievement, higher-order thinking skills, and the effectiveness of teaching–learning processes. These studies tend to conceptualize

problem solving primarily in terms of cognitive performance and measurable learning outcomes, while giving comparatively limited attention to dimensions such as pedagogical design, interdisciplinary structuring, and the longitudinal effects related to the sustainability of learning

On the other hand, several studies have examined interdisciplinary approaches (Dursun & Bahadır, 2023; Karakuş & Yalçın, 2017; Özcan, Batur & Yusufoğlu, 2023; Omur & Uyar, 2020; Turna & Bolat, 2015) based on various variables and provided comprehensive evaluations of the current state of the field. When these studies are considered collectively, it becomes evident that postgraduate theses grounded in interdisciplinary approaches are predominantly conducted at the master's level and largely employ quantitative research designs, while doctoral-level studies remain relatively limited. Furthermore, research appears to be concentrated mainly within the social sciences, and the overall number of theses adopting an interdisciplinary approach in Turkey remains low.

Studies examining problem-solving skills in the literature indicate that research in this area predominantly focuses on mathematical problem solving and is mainly concentrated at the middle school level, with a strong reliance on quantitative research designs (Aksungur & Aydın, 2023; Bayar, 2023; Hallinger, 2021; Kurtulmuş & Akgül, 2023). Although numerous postgraduate theses address mathematical problem solving at the primary level, studies emphasizing pedagogical development, instructional design, and practical implementation remain limited and are largely grounded in experimental quantitative frameworks, whereas comprehensive or design-oriented methodologies are less frequently employed. Research on problem-based learning has expanded beyond the health sciences to encompass diverse cultural contexts and has increasingly addressed variables such as self-directed learning, student satisfaction, self-efficacy, critical thinking, and collaboration. However, despite this thematic expansion, methodological diversity and longitudinal impact analyses remain insufficient. Overall, the literature reflects a quantitatively oriented research pattern characterized by thematic diversification across educational levels, yet limited interdisciplinary integration and inadequate long-term evaluation of learning outcomes.

Studies evaluating the current state of problem solving generally adopt a discipline-based approach and focus on specific fields such as mathematics and science (OECD, 2010; Repko, Szostak & Buchberger, 2019). Large-scale assessments such as PISA further reinforce this tendency by addressing problem solving through discipline-based performance indicators. However, this approach limits the comprehensive analysis of research trends, thematic orientations, and methodological distributions within the literature. Therefore, there is a need for systematic and comprehensive analyses that reveal the structural characteristics, research patterns, and methodological orientations of the field through a systematic mapping approach.

Similarly, research on interdisciplinary problem solving has largely been associated with the STEM approach, focusing on Science, Technology, Engineering, and Mathematics (Wang et al., 2011; Zhan et al., 2022). Although STEM-based scholarly works occupy a significant place in the literature, interdisciplinary problem-solving research should not be confined to specific disciplines and must be extended to include social sciences and other fields. A review of the literature indicates that inquiries systematically analyzing institutional contributions, disciplinary participation, and research gaps in this area are limited. In this context, systematic mapping studies play a critical role in identifying the overall structure of the field, making research gaps visible, and guiding future investigation directions by providing a comprehensive overview of existing studies.

From an educational and pedagogical perspective, such analyses contribute to the development of evidence-based curriculum design, interdisciplinary teaching strategies, and instructional planning. Identifying prevailing trends and research gaps contributes to the development of more integrated learning environments and strengthens the theoretical and practical foundations of interdisciplinary problem-solving education. This approach is considered a fundamental pedagogical paradigm that fosters the development of individuals equipped with the critical thinking, multidisciplinary collaboration, and complex problem-solving competencies required in the 21st century.

In this context, and in response to the need for a structured and comprehensive evaluation of the field, this study aims to systematically map research on interdisciplinary problem solving in education, with a primary focus on the contemporary scientific discourse in Turkey. While the main analytical framework is grounded in national postgraduate theses and related studies, selected international publications are also examined to provide comparative insight and to situate Turkish research trends within a broader scholarly context. In this way, the study seeks to reveal the structural characteristics of the field, identify prevailing research tendencies, and determine existing gaps in the literature.

2. RESEARCH METHODS

2.1.Research Design

In this study, a systematic mapping approach was employed to analyze interdisciplinary problem-solving research in education and to identify the structural features, research trends, and existing gaps in the field. The systematic mapping method provides a comprehensive evaluation for identifying research gaps and emerging needs in the existing literature (Petersen, Feldt, Mujitaba & Mattsson, 2008). This method systematically classifies and maps existing knowledge on a given topic in order to identify research gaps and potential directions for future research. The systematic mapping method comprises five main stages (Petersen et al., 2008).

2.2 Formulation of the Research Questions

As part of the first stage of the systematic mapping method, the research questions were formulated to establish a framework for the subsequent analysis. In this context, the study is guided by the following research questions:

1. What is the distribution of theses and articles by publication years?
2. What is the distribution of theses by type?
3. What is the distribution of theses and articles by research methods?
4. What is the distribution of theses and articles by study groups?
5. What is the distribution of theses and articles by associated disciplines?

2.3 Database Selection

After determining the keywords and search strings, the scientific databases used for the literature search were selected. The study includes theses and articles on interdisciplinary problem solving indexed in the Council of Higher Education National Thesis Center (YÖK Thesis Database), Google Scholar, TR Index, and DergiPark. National databases were selected to systematically capture theses and articles indexed at the national level and to ensure representation of national academic production. Google Scholar was included to expand the search scope to international and interdisciplinary publications and to identify studies that may not be indexed in national databases.

The inclusion of both theses and articles enables a comprehensive and systematic mapping of the literature. Their combined analysis facilitates the identification of structural patterns, thematic distributions, and research gaps. Theses contribute to understanding institutional research priorities and degree-level distributions, while articles reflect dissemination patterns and scholarly engagement.

The scope of the study is limited to research conducted at the primary and middle school levels, including studies involving students and teachers at these educational stages. These groups were selected because interdisciplinary problem-solving research is primarily implemented and evaluated within classroom-based educational settings.

Since a limited number of theses were identified in the YÖK Thesis Database, the search strategy was expanded to ensure broader coverage. Accordingly, the terms “STEM,” “STEAM,” and the Turkish equivalent “FeTeMM” were incorporated into the search process. During the literature search, the term “interdisciplinary problem solving” was used in combination with these related keywords to adopt a comprehensive approach.

The study sample was selected through criterion sampling, which is one of the purposive sampling methods. Criterion sampling involves selecting cases that meet predefined criteria based on the research objectives (Patton, 2002). In this study, the primary criterion was theses focusing on interdisciplinary problem solving conducted at the primary and middle school levels in Türkiye. In addition, national and international articles addressing interdisciplinary problem solving were included according to the same eligibility criteria.

2.4 Screening and Evaluation of Database Results

An initial search across the identified databases yielded a total of 115,438 records (CoHE National Thesis Center = 181; Google Scholar = 3,940; TR Index = 15; DergiPark = 96,498). After removing 540 duplicate records, 114,898 records remained for screening. Following the title and abstract screening, 110,463 records were excluded as they were not directly related to problem-solving. As a result, 4,435 studies related to interdisciplinary problem-solving were identified.

These findings were then assessed for eligibility through full-text review in accordance with the inclusion criteria, and 44 of which were included in the final analysis. The selected theses and articles cover the period between 2015 and 2023. Considering publicly accessible studies, the final sample consisted of 35 theses conducted at the primary and middle school levels in Türkiye and 9 national and international articles focusing on interdisciplinary problem-solving.

2.5 Extraction and Coding of Keywords from Abstracts

The abstracts of the included studies were systematically analyzed using content analysis to identify concepts directly related to the research topic. Recurrent, thematically meaningful, and research question–related expressions in the abstracts were identified, and keywords were extracted accordingly. The identified concepts were standardized, coded, and transferred into the classification form. The coding process was conducted independently by the researchers, after which the codes were compared to ensure consistency. Consensus was reached on discrepant codes, and the final set of keywords was established. Thus, the data were structured in a systematic and analyzable format.

2.6 Data Extraction and Mapping

Based on the expert's feedback, the data recorded in the Excel file were reorganized under common codes to ensure a systematic and standardized structure. In line with the expert recommendations, overlapping and similar concepts were merged, and the codes were standardized according to the terminology used by the researchers in the examined studies. In this process, certain concepts were restructured and combined. For example, the terms "interview" and "interview form" were merged under the code "Interview Form"; the concepts of "phenomenon," "science," and "technology" were grouped under the code "Science and Technology." Similarly, instead of treating the designs "parallel design" and "convergent parallel" separately, they were consolidated under the single code "Convergent Parallel Design." For data analysis and visualization, the VOSviewer software was used. VOSviewer is a program that enables the creation and visualization of maps based on data derived from studies in the literature (van Eck & Waltman, 2010). The frequency distributions of the coded data were calculated in Excel, and the results for each research sub-question were presented through graphical representations in the findings section.

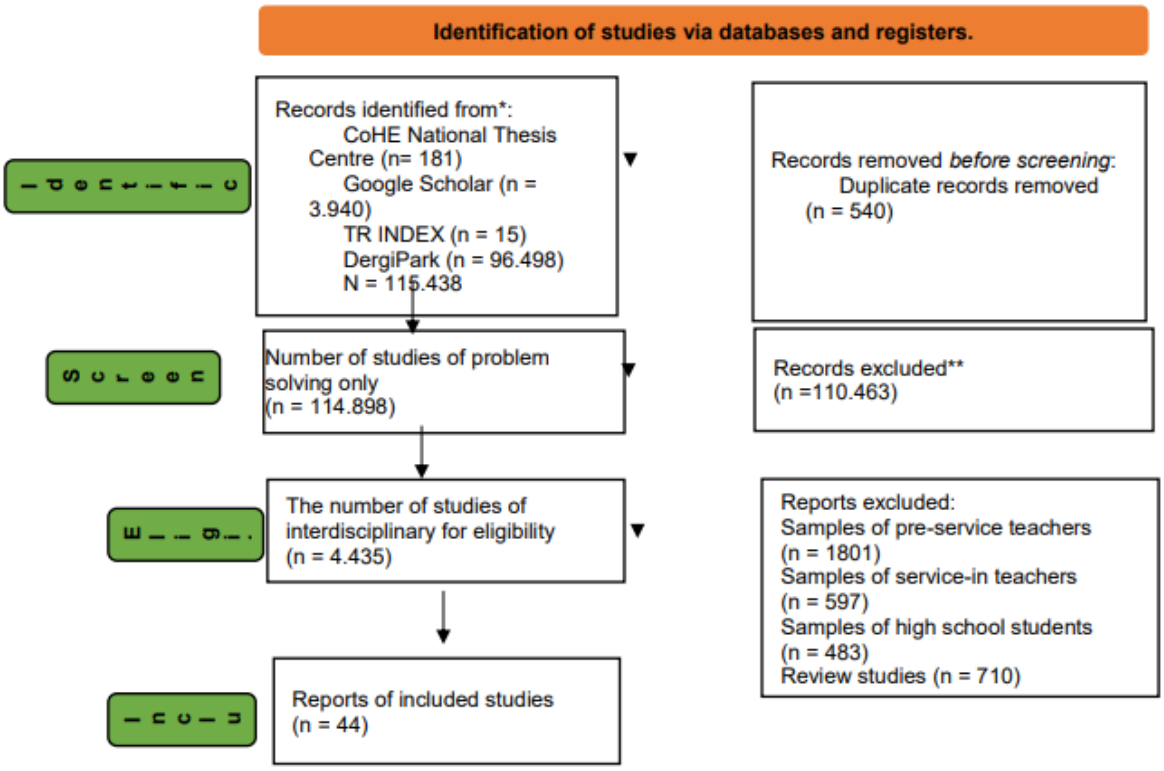

Fig 1. Flow chart showing the determination of theses and articles

Source: Developed by the authors

3. RESULTS AND DISCUSSION

3.1. Findings Regarding the First Sub-Problem

The findings regarding the first sub-problem of the research, "What is the distribution of theses and articles by publication year?" are shown in Figure 2.

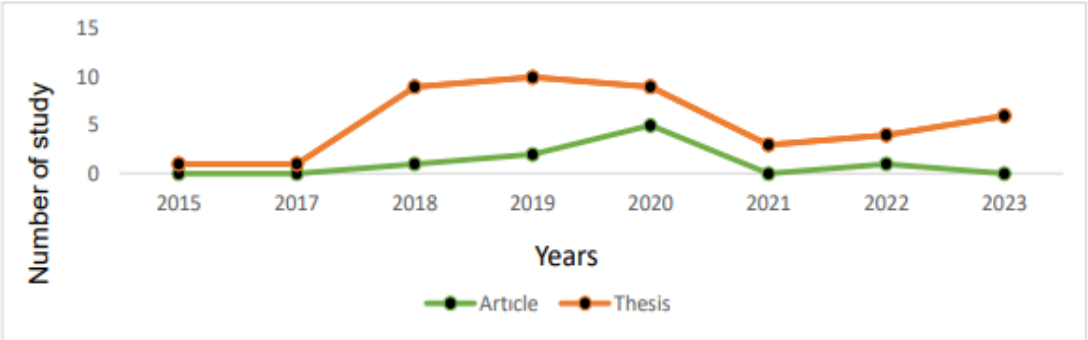

Fig 2. Visualization of the distribution of theses and articles by year

Source: Developed by the authors

Figure 2 shows that, within the scope of interdisciplinary problem solving, theses were conducted between 2015 and 2023, whereas articles were published between 2018 and 2022. The number of theses and articles varied across the years. An increase in the number of theses was observed in the 2017–2018 period, and the highest number of theses was published between 2018 and 2019. The lowest number of theses studies was recorded between 2015 and 2017. Although a decline in thesis publications was observed after 2019, an increase was seen again from 2022 onward. No theses were published on interdisciplinary problem solving in 2016 (f:0). Regarding articles, the highest number was published in 2020 (f:5), while the lowest numbers were recorded in 2018 (f:1) and 2022 (f:1). Based on the data

presented in the figure, it can be inferred that research output in recent years has shown fluctuations, and limited publications have been produced in certain periods.

The overall findings suggest that publication activity in the field of interdisciplinary problem solving has been concentrated in specific periods rather than demonstrating a sustained long-term growth trend. Although the field attracts intermittent scholarly attention, the absence of continuous publication expansion suggests that a fully established and systematically developing research trajectory has yet to emerge. Recent publication patterns confirm the persistence of academic interest in the topic; however, the limited and fluctuating output underscores the need for more extensive, consistent, and methodologically diverse research to facilitate the maturation of the field.

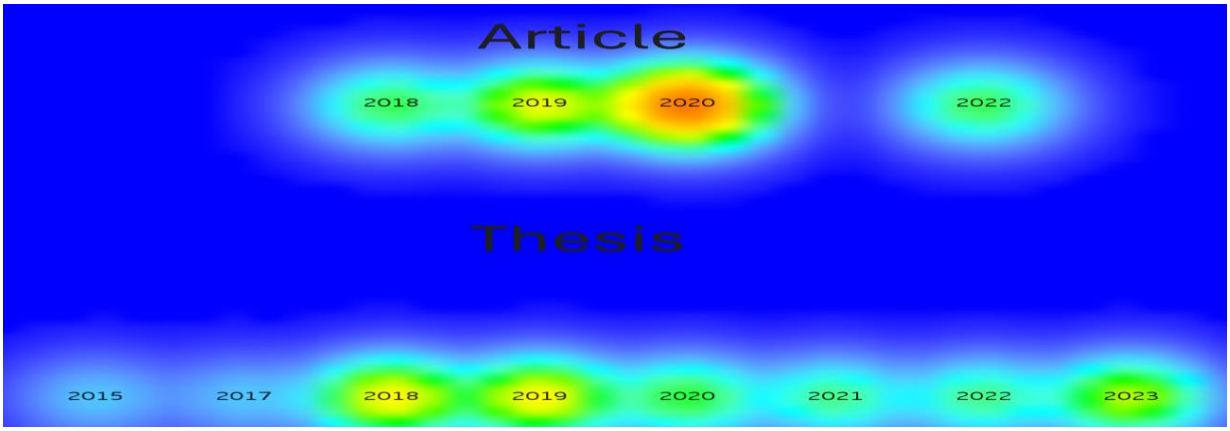

Fig 3. Heat map illustrating the distribution of publication years in theses and articles
Source: Developed by the authors using VOSviewer

Figure 3 shows clusters represented by different color intensities and varying sizes. It indicates that theses related to interdisciplinary problem solving are grouped into eight clusters, while articles are grouped into four clusters. When the color intensity of the clusters is examined, it is observed that the highest number of thesis studies occurred in 2018 and 2019, whereas the highest number of article studies was recorded in 2020. A comparison of article and thesis clusters reveals that some years show no color intensity, indicating an absence of publications during those periods. Specifically, no articles were published between 2015 and 2017 and in 2021, while no theses were published in 2016. This cluster distribution indicates that research output in the field of interdisciplinary problem solving has concentrated in specific periods but has not demonstrated a systematic and balanced publication trend across the years. The absence of publications in certain years points to potential structural limitations in the continuity and institutional diffusion of research within the field.

3.2. Findings Regarding the Second Sub-Problem

The findings regarding the second sub-problem of the research, "What is the distribution of theses by type?" are shown in Figure 4.

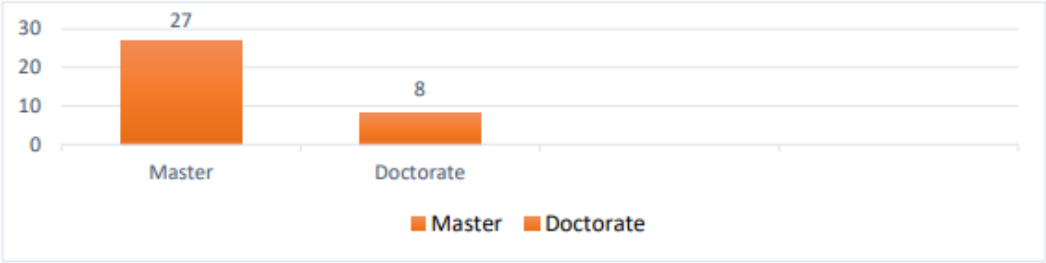

Fig 4. Visualization of the distribution of theses according to type
Source: Developed by the authors

As shown in Figure 4, a total of 35 theses were conducted on interdisciplinary problem solving. Master's theses (f = 27) constitute the majority of the studies, while doctoral theses (f = 8) represent a smaller proportion of the total research output. This distribution indicates that master's theses are significantly more prevalent than doctoral dissertations, suggesting that the field is predominantly represented by studies at the initial and applied research level. The limited number of doctoral dissertations implies that in-depth theoretical and methodological developments in the field have not yet become widespread. This imbalance between graduate levels suggests that the field is still in the process of academic maturation and that its theoretical foundation requires further strengthening.

3.3.Findings Related to the Third Sub-Problem

The findings related to the fourth sub-problem of the research, "What is the distribution of theses and articles by method?" are shown in Figure 5.

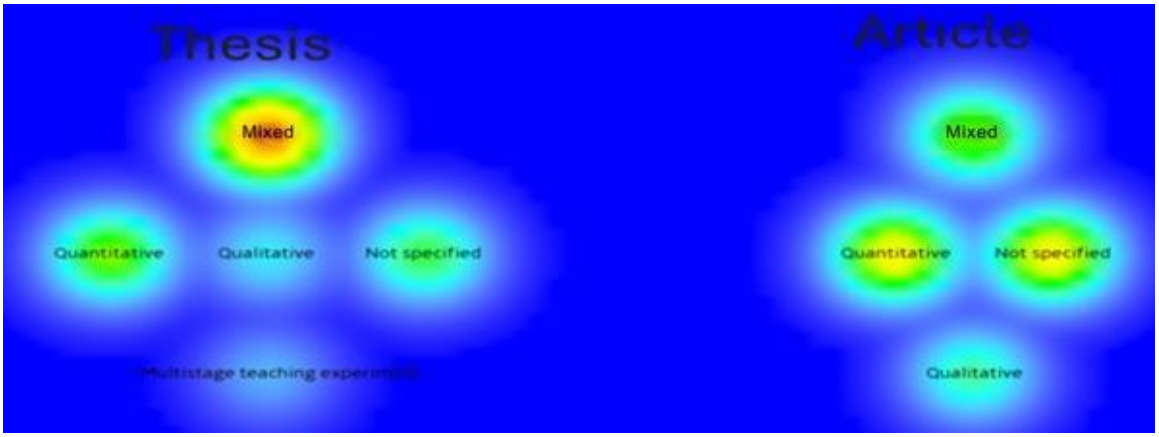

Fig 5. Heat map illustrating the distribution of research methods in theses and articles
Source: Developed by the authors using VOSviewer

As shown in Figure 5, five different clusters are identified for theses and three clusters for articles. The one representing the mixed-method approach under the thesis category demonstrates the highest color intensity, indicating that this method is the most frequently used in thesis studies. In contrast, the multi-case teaching experiment appears to be the least preferred method, as reflected by its low color intensity. Under the article category, the quantitative method and studies that do not specify a method exhibit higher color intensity compared to other clusters. This suggests that quantitative designs are more commonly preferred in article-based research. Additionally, the qualitative method shows low color intensity in both theses and articles, indicating that it is less frequently employed in the examined studies.

Theses and articles demonstrate a clear methodological concentration in specific research approaches, while alternative methods remain comparatively underrepresented. The predominance of mixed methods in theses and quantitative approaches in articles suggests a tendency toward methodological preferences rather than diversity in research design. The limited representation of qualitative and multi-method designs indicates a need for broader methodological diversification to strengthen analytical depth and balance within the field.

3.4.Findings Related to the Fourth Sub-Problem

The findings related to the sixth sub-problem of the research, "What is the distribution of theses and articles by study group?" are shown in Figure 6.

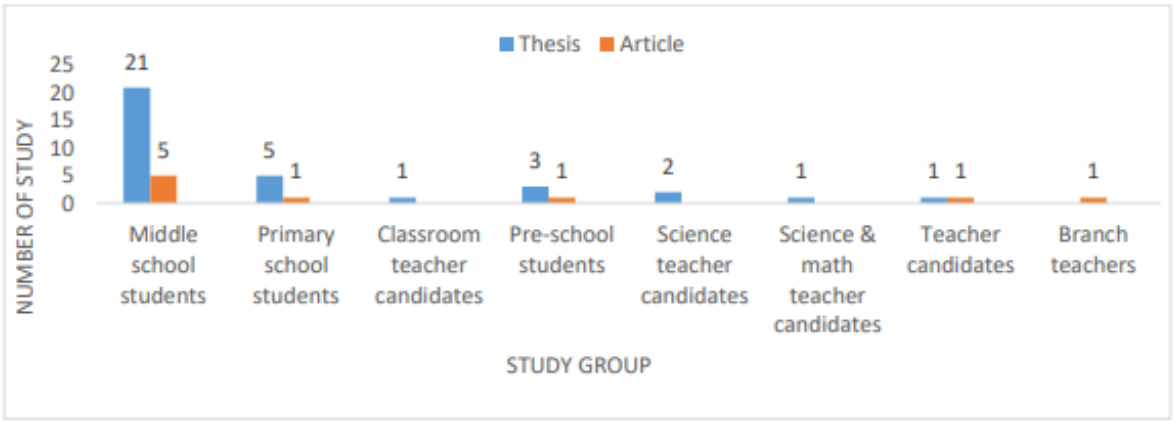

Fig 6. Visualization of the distribution of theses and articles by study groups

Source: Developed by the authors

As shown in Figure 6, seven different study groups are identified in theses and five in articles. Regarding theses, the majority of studies were conducted with middle school students (f = 21), followed by primary school students (f = 5) and pre-school students (f = 3). Similarly, middle school students constitute the most frequently studied group in articles (f = 5). In terms of teacher-related populations, theses primarily involve science, mathematics, and classroom teachers, whereas articles focus on pre-service teachers and branch teachers. This indicates variation in the participant profiles between theses and articles.

This distribution indicates that the studies are concentrated on a specific educational level and that a balanced representation in the sample structure has not yet been achieved. The predominance of the middle school level suggests a research orientation primarily focused on this educational stage; however, other educational levels and stakeholder groups appear to be represented to a more limited extent. Although the diversity observed in the teacher sample reflects an effort to include different actors, this inclusion has not yet reached a systematic and comprehensive structure. In particular, the limited representation of preschool and other stakeholder groups points to a methodological and thematic need to expand sample diversity in future studies.

3.5.Findings Related to the Fifth Sub-Problem

The findings related to the eighth sub-problem of the research, "What is the distribution of theses and articles according to the disciplines they are associated with?" are shown in Figure 7.

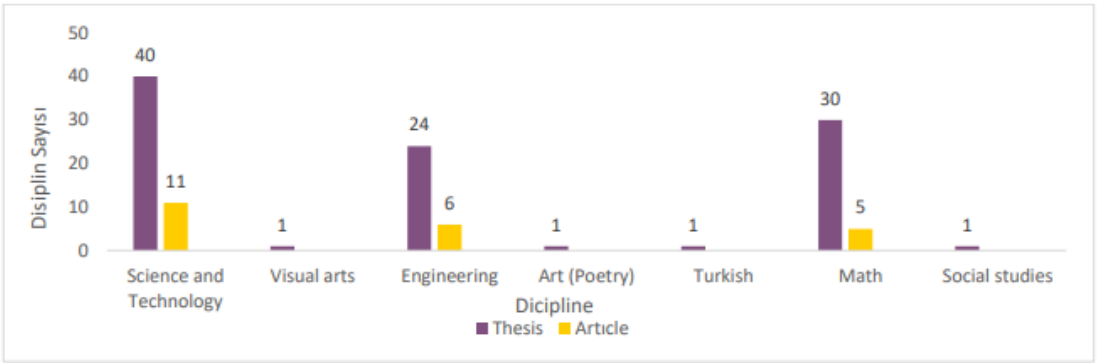

Fig 7. Visualization of the distribution of theses and articles by associated disciplines

Source: Developed by the authors

According to Figure 7, seven disciplines are associated with different disciplinary fields in theses, whereas three disciplines are identified in articles. The findings indicate that in theses, the most

frequently associated disciplines are science and technology (f = 40), mathematics (f = 30), and engineering (f = 24). In contrast, disciplines such as visual arts, art, Turkish, and social studies are represented to a limited extent. In articles, the most frequently associated discipline is science and technology (f = 11), followed by engineering (f = 6) and mathematics (f = 5). Overall, the disciplinary diversity observed in theses is greater than that in articles.

Although disciplinary relationships in theses appear to be more diverse compared to articles, this diversity is largely concentrated in STEM-oriented fields and shows limited expansion beyond core disciplines. The dominance of science and technology, mathematics, and engineering indicates that interdisciplinary problem-solving research is primarily grounded in technical domains. The relatively weak representation of disciplines such as visual arts, social studies, and Turkish suggests that the broader potential for interdisciplinary integration has not been sufficiently utilized.

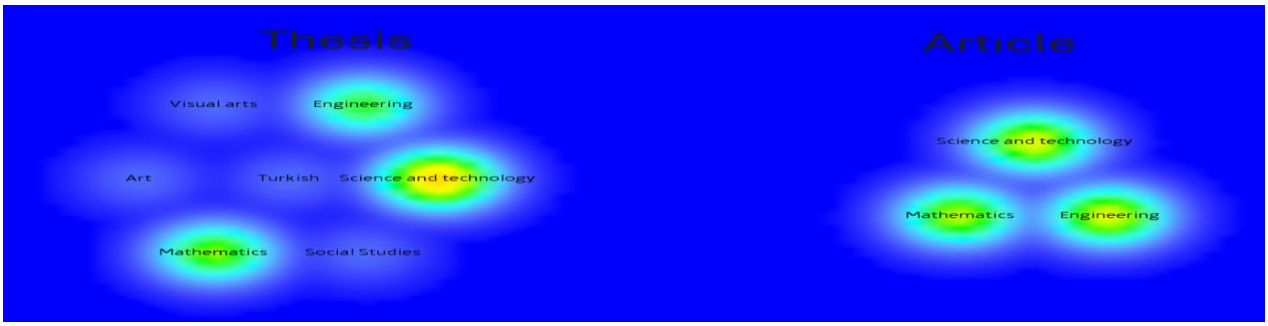

Fig 8. Heat map illustrating the distribution of associated disciplines in theses and articles
Source: Developed by the authors using VOSviewer

When Figure 8 is examined, seven clusters are identified under the thesis category and three clusters under the article category. Under the thesis category, the higher color intensity observed in the center of the science and technology cluster indicates that a substantial number of interdisciplinary problem-solving theses are associated with this discipline. Based on the color intensities, this cluster is followed by mathematics and engineering, which also demonstrate relatively strong associations. This cluster structure indicates that interdisciplinary relationships in thesis studies are concentrated in specific fields, while the overall distribution lacks balance and a comprehensive structure. The low representation of disciplines outside science and technology suggests that the broader potential for interdisciplinary expansion has not yet been fully reflected in the existing research.

4. CONCLUSIONS

In line with the purpose of this study, a systematic mapping approach was employed to examine research on interdisciplinary problem solving in education, with particular attention to the Turkish scientific context. Through this approach, the structural characteristics of the field, prevailing research trends, and existing research gaps were identified. International publications were incorporated in a comparative and contextual manner to enrich the analysis and to situate Turkish research within the broader scholarly literature. Within this framework, 35 theses and 9 articles were analyzed to provide a comprehensive overview of the literature. The findings were presented in accordance with the predefined sub-research questions, ensuring a coherent and systematic interpretation of the results.

The temporal distribution of publications reveals that research output is concentrated in specific periods rather than demonstrating sustained continuity. This fluctuation indicates that the field has not yet developed a stable and self-sustaining research trajectory. The dominance of established interdisciplinary frameworks such as STEM and related approaches reflects the influence of widely adopted conceptual models, which structure research production around recognizable paradigms (Wang et al., 2011; Zhan et al., 2022). While these frameworks contribute to visibility and organization, they may also constrain broader conceptual expansion.

The predominance of master's theses over doctoral dissertations suggests limited theoretical deepening at advanced academic levels (Özcan, Yusufoğlu & Batur, 2023). Interdisciplinary problem solving requires long-term conceptual refinement and methodological sophistication; however, current research production indicates stronger emphasis on applied investigation rather than advanced theoretical consolidation. Strengthening doctoral-level engagement would enhance analytical depth and support sustained knowledge development.

Methodologically, mixed-method and quantitative designs dominate the literature. The use of mixed methods reflects attempts to capture complexity through methodological triangulation and complementarity (Creswell & Creswell, 2017; Patton, 2002). Quantitative approaches remain prevalent due to their capacity for standardization and generalizability (Bryman, 2016). However, the limited representation of qualitative and alternative research designs suggests restricted methodological pluralism. Such concentration may limit interpretive depth and reduce opportunities for theoretical innovation. The underrepresentation of methodological diversity indicates a structural reliance on conventional research models rather than exploratory or design-based approaches (Burns & Grove, 1993; Fraenkel & Wallen, 2006).

In terms of participant groups, research primarily focuses on middle school students, while other stakeholders are comparatively underrepresented. The limited inclusion of broader educational actors constrains systemic understanding of interdisciplinary problem solving as an ecosystem-level phenomenon. The absence or minimal representation of certain participant groups reflects a gap in stakeholder diversification and contextual expansion (Çepni et al., 2014). Expanding participant heterogeneity would improve generalizability and strengthen empirical robustness.

Disciplinary distribution demonstrates strong concentration around science, mathematics, and engineering domains. This pattern indicates that interdisciplinary integration is largely framed within core STEM boundaries. Although these disciplines provide an established foundation for interdisciplinary inquiry, the limited participation of humanities, arts, and social sciences signals restricted epistemic expansion. The dominance of specific disciplinary clusters implies that interdisciplinarity is operationalized more as disciplinary aggregation than as comprehensive cross-domain synthesis.

Overall, the findings reveal that interdisciplinary problem-solving research is in a phase of growth but not structural maturity. The primary research gaps lie in theoretical consolidation, methodological diversification, disciplinary expansion, and advanced-level academic engagement. Future research should go beyond descriptive mapping toward deeper conceptual integration and stronger research infrastructure to ensure long-term academic sustainability and epistemic development.

Author Contributions:

Each author contributed equally to all aspects of this research, including Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, and Writing – review & editing.

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Юсуфоглу Сімузар, Батур Зекерья. Міждисциплінарне вирішення проблем в освіті: систематичне картографування з акцентом на турецькому науковому контексті. *Журнал Прикарпатського університету імені Василя Стефаника*, **13** (1) (2026), 161-175.

Це дослідження відображає наукові розвідки щодо міждисциплінарного вирішення проблем в освіті, зосереджуючись насамперед на турецькому науковому контексті. Міжнародні праці включені для забезпечення повного контекстуального порівняння та позиціонування національних дослідницьких тенденцій у наукових джерелах. Дослідження має на меті визначити структурні характеристики галузі, виявити панівні тенденції та наявні прогалини. У межах цієї структури було проаналізовано 35 дисертацій і 9 статей, опублікованих між 2015 та 2023 роками, за такими критеріями: рік публікації, академічний рівень, метод дослідження, робоча група, пов'язані дисципліни та тематична спрямованість. Результати засвідчують, що дисертації часто публікувалися у 2018 та 2019 роках, тоді як статті досягли піку у 2020 році, що відображає період інтенсифікації академічного та інституційного наукового інтересу. Магістерські роботи становлять більшість досліджень, тоді як докторські студії залишаються обмеженими за кількістю й теоретичним внеском. У дисертаціях переважно використовувалися змішані методи дослідження, тоді як у статтях частіше зустрічалися кількісні моделі, що вказує на обмежену методологічну різноманітність і мале використання якісних підходів. Учні загальноосвітньої школи були групою, яку вивчали найчастіше, тоді як вчителі, батьки та інші зацікавлені сторони залучалися обмежено. Розподіл навчальних предметів був зосереджений на науковій складовій, математиці та інженерії під впливом підходів STEM і STEAM, тоді як соціальні науки та мистецтво залишаються мало представленими. Хоча інтерес до галузі зріс, методологічного балансу не досягнуто, а теоретична консолідація залишається обмеженою. Дослідження підкреслює необхідність урізноманітнення дизайну досліджень, розширення профілів учасників та посилення всебічного аналізу на рівні докторантури.

Ключові слова: міждисциплінарне розв’язання проблем, систематичне картографування, освітні дослідження, тенденції досліджень, педагогічні підходи, методологічне різноманіття.