

**HOW DOES RESEARCH INFORM THE TEACHING  
OF STEAM IN TÜRKIYE?  
IMPLICATIONS FOR BUILDING CONGRUENCE  
BETWEEN RESEARCH AND PRACTICE**

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**Abstract.** The purpose of this systematic literature review is to identify methodological and thematic trends in STEAM teaching research in Türkiye over the last five years, from 2018 to 2023. The data for this study came from 31 open-access theses in the archives of the Higher Education Council (HEC) National Thesis Center and 11 articles published in journals indexed in TRINDEX. The Research Review Form was used to collect data which were analyzed with descriptive statistics (frequency, percentage). In the studies reviewed, the most frequently mentioned research method was mixed ( $n = 15$ ). The most preferred research strand was the effects of STEAM education on predetermined variables ( $n = 16$ ), which included achievement, attitudes toward art, attitudes toward STEAM, career interests, STEAM conceptions, creativity, and scientific creativity.

**Keywords:** Practice, research, STEAM, teaching, Türkiye.

**Rezumat.** Scopul acestei revizuirii sistematice a literaturii este de a identifica tendințele metodologice și tematice în cercetarea didactică STEAM în Turcia în ultimii cinci ani, din 2018 până în 2023. Datele pentru acest studiu au provenit din 31 de teze cu acces deschis din arhivele Consiliului Învățământului Superior, Centrul Național de Teze și 11 articole publicate în reviste indexate în TRINDEX. Formularul de revizuire a cercetării a fost folosit pentru a colecta date care au fost analizate cu statistici descriptive (frecvență, procent). În studiile analizate, metoda de cercetare cel mai frecvent menționată a fost mixtă ( $n = 15$ ). Cea mai preferată direcție de cercetare a fost efectele educației STEAM asupra variabilelor predeterminate ( $n = 16$ ), care au inclus realizările, atitudinile față de artă, atitudinile față de STEAM, interesele de carieră, concepțiile STEAM, creativitatea și creativitatea științifică.

**Cuvinte cheie:** practică, cercetare, STEAM, predare, Turcia.

## **Introduction**

STEAM, as an acronym which stands for teaching and learning in the fields of science, technology, engineering, arts, and mathematics, is “the integration of the arts and design principles, concepts, and techniques with STEM instruction and learning” (National Art Education Association, 2022). As the most recent proposed addition to STEM education, STEAM will revitalize the role of creativity and innovation in STEM (Daugherty, 2013). Despite being a new integrated curriculum, STEAM has already been the subject of numerous studies. According to Eisner (1984), educational research can be used to guide practical decisions. In order to have an impact on practitioners, educational researchers need to show some evidence that it works better than what practitioners are

doing (Baker, 1984). Hence, practitioners will be able to build congruence between what they read and understand from research and what they do. For this purpose, practitioners must be well-versed in research. Adhering to this way of thinking, the goal of this research is to identify the methodological and thematic trends in research on STEAM teaching in Türkiye over the last five years, between 2018 and 2023. To this end, answers to the following problems were sought:

1. What are the methodological trends in STEAM teaching research in Türkiye between 2018 and 2023?

2. What are the thematic trends in STEAM teaching research in Türkiye between 2018 and 2023?

It is also believed that determining the methodological and thematic trends of the last five years in research on STEAM teaching in Türkiye will provide the foundation for new research by providing researchers with an idea of the trends and needs. Because there have been few studies examining STEAM teaching in Türkiye (Ata Aktürk & Demircan, 2017; Gülhan, 2022), this research is expected to fill a gap in the literature.

## **Method**

A systematic literature review method was used in this research to identify methodological and thematic trends in STEAM teaching research in Türkiye between 2018 and 2023. This study presents a systematic literature review, with work chosen based on clearly defined and explained inclusion criteria (Higgins, Thomas, Chandler, Cumpston, Li, Page, & Welch, 2019). 31 open-access theses with the word “STEAM” in the title, written in Türkiye between 2018 and 2023 and located in the archives of the Higher Education Council (HEC) National Thesis Center, and the subject of which is “Education-Teaching”, as well as 11 articles registered in the “Social” database and published in journals indexed in TRINDEX provided data for this research. The Research Review Form, which was finalized by expert review, was used as a data collection tool. The research review form was developed obtaining expert opinions to ensure the credibility of the data (Miles & Huberman, 1994). Data were gathered in accordance with the dimensions included in the research review form (type of research, method and design of research, theme of research).

To ensure transferability (Miles & Huberman, 1994), the following steps taken during the data collection process are described in detail below:

1. To find theses on STEAM teaching in Türkiye in the HEC National Thesis Center archives, “STEAM” was typed into the thesis title and searched in the simple search section. After filtering out the ones related to “Education-Teaching” from the 277 theses discovered, a total of 31 theses were listed. The researcher accessed the 31 theses listed from the HEC National Thesis Center archive on October 6, 2023.

2. For articles related to STEAM teaching in Türkiye that were published in journals indexed in TRINDEX, “STEAM” was written in the title of the article and searched in the advanced search section. When the articles registered in the “Social” database were filtered, 14 were found. However, two of these 14 articles were excluded from the research because they were published prior to 2018, and one was related to the context of the United Arab Emirates. The researcher accessed these 11 articles published in journals indexed in TRINDEX on October 6, 2023.

The data collected with the research review form were analyzed using descriptive statistics (frequency, percentage) to determine the methodological and thematic trends of the last five years in research on STEAM teaching in Türkiye between 2018 and 2023.

## **Findings**

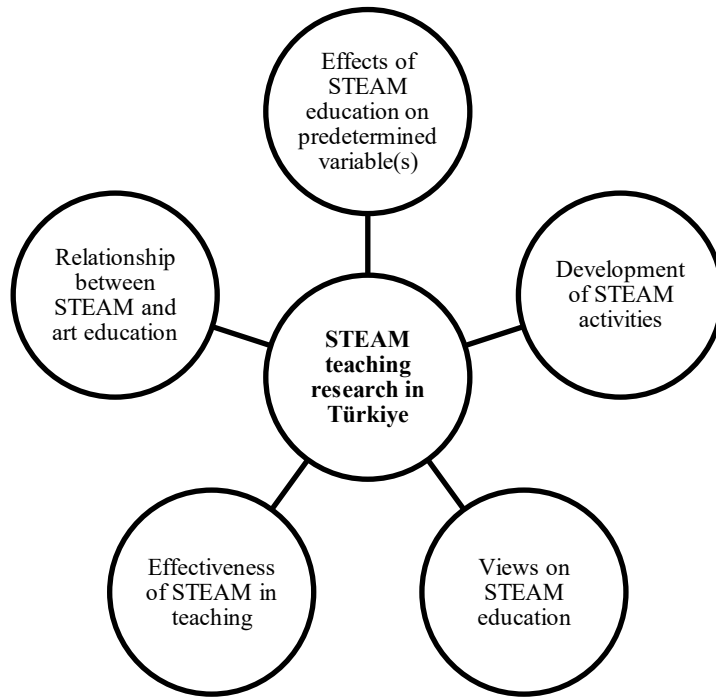
When the distribution of STEAM teaching research in Türkiye between 2018 and 2023 is examined by research type, 31 of the studies are theses, 11 are articles, 23 of the 31 theses are master’s theses, 8 are doctoral dissertations, 9 of the 11 articles are research articles, and 2 are review articles.

## **Methodological trends in STEAM teaching research in Türkiye between 2018 and 2023**

When the distribution of research on STEAM teaching in Türkiye between 2018 and 2023 is examined according to their methods, it is notable that the method is not specified in five of the 40 studies, with the exception of two review articles. The most frequently mentioned research method in the studies examined was mixed ( $n = 15$ ). Following the mixed research method are the qualitative research method ( $n = 14$ ), the quantitative research method ( $n = 4$ ), and the descriptive research method ( $n = 2$ ). When the distribution of research on STEAM teaching in Türkiye between 2018 and 2023 was examined according to their designs, it was discovered that, with the exception of two review articles, the design was not specified in seven of the 40 studies. The most commonly mentioned research designs in the studies reviewed were embedded design ( $n = 6$ ) and action research design ( $n = 6$ ). These two designs are followed by survey design ( $n = 5$ ), case study design ( $n = 4$ ), explanatory sequential design ( $n = 3$ ), and one-group pre-test – post-test experimental design ( $n = 2$ ). The following research designs were used in the studies examined: quasi-experimental pre-test – post-test control group design ( $n = 1$ ), grounded theory ( $n = 1$ ), phenomenology ( $n = 1$ ), nonequivalent control group quasi-experimental design ( $n=1$ ), design-based research ( $n=1$ ), multi-phase mixed methods design ( $n=1$ ), and convergent design ( $n=1$ ).

### **Thematic trends in STEAM teaching research in Türkiye between 2018 and 2023**

When the distribution of research on STEAM teaching in Türkiye between 2018 and 2023 was examined according to themes, it was discovered that the majority of the research was collected under the following five strands: effects of STEAM education on predetermined variable(s) (n=16), development of STEAM activities (n=12), views on STEAM education (n=6), effectiveness of STEAM in teaching (n=3), and relationship between STEAM and art education (n=2). Furthermore, the following themes were discovered in the studies examined: attitudes toward STEAM (n=1), competencies of a STEAM teacher (n=1), and development of a STEAM-related scale (n=1).



**Figure 1. Thematic trends in STEAM teaching research in Türkiye between 2018 and 2023**

The following are the predetermined variables that were investigated in research on STEAM teaching in Türkiye between 2018 and 2023: achievement (n=6), attitudes toward art (n=2), attitudes toward STEAM (n=2), career interests (n=2), conceptions of STEAM (n=2), creativity (n=2), and scientific creativity (n=2). Apart from these variables, the impact of STEAM teaching on artistic way of knowing (n=1), attitudes toward science (n=1), attitudes toward mathematics (n=1), career choices (n=1), conceptual changes (n=1), conceptual learning (n=1), creative thinking (n=1), design-based thinking skills (n=1), entrepreneurship (n=1), environmental awareness (n=1), interest in art (n=1), learning styles (n=1), mathematical self-efficacy (n=1), scientific process skills (n=1), skill development (n=1), STEAM performance (n=1), and visual spatial reasoning skills (n=1) was also investigated. In studies on the development of STEAM activities, it was seen that STEAM activities were developed mostly for pre-

service/in-service teachers (art education, elementary education, gifted education, science education) (n=4) and middle school students (n=4). These studies are followed by studies in which STEAM activities were developed for pre-school children (n = 2), gifted students (n = 1), and elementary school students (n = 1). The views of field experts (n = 3), elementary school students (n = 2), and gifted students and their teachers (n = 1) were determined in the research revealing the views on STEAM education in Türkiye between 2018 and 2023. The effectiveness of STEAM teaching in middle school science (n = 2) and middle school visual arts (n = 1) was examined in studies examining the effectiveness of STEAM teaching in Türkiye between 2018 and 2023. The relationship between STEAM and art education, as well as the role of STEAM as an interdisciplinary approach in visual arts education, were discussed in two studies examining the relationship between STEAM and art education in Türkiye between 2018 and 2023.

## Conclusion

The current study's findings revealed that the most commonly mentioned research method was mixed. The most preferred research strand was the effects of STEAM education on predetermined variables such as achievement, attitudes toward art, attitudes toward STEAM, career interests, STEAM conceptions, creativity, and scientific creativity. As a result of this research, it can be stated that teaching of STEAM was embedded in the mixed-method research as an intervention, and its effects on achievement and attitude were mostly investigated. These findings may have implications for practitioners who teach STEAM in Türkiye. Practitioners will take away lessons from the findings of this research that require further inquiry in order to effectively teach STEAM to (1) improve the development of their students' 21st century/life skills, (2) plan STEAM activities for pre-school, elementary, and high school students, and (3) teach STEAM in subjects other than science and visual arts.

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