# Interdisciplinary Team Science in the Remote Workplace: A Scoping Review

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**Abstract**: The COVID-19 pandemic has altered the nature of teamwork in the workplace. However, the use of team technologies (i.e. Zoom, Microsoft Teams) have eliminated the social distance between individuals, increasing the efficiency of remote working conditions. This scoping review focuses on understanding factors influencing interdisciplinary team science in the remote workplace. The results suggest four factors, namely diversity, leadership, curriculum, and participative safety that have a significant influence on whether or not teams can be successful in a remote workplace.

## Introduction

Team science is trending due to remote conditions caused by the global pandemic. Many in academe and industry alike have been affected by work-from-home conditions, and this evolving workplace has caused a shift in team science across disciplines. There are several definitions of interdisciplinary team science specific to university, medical, and public groupings. For the purposes of this paper, interdisciplinary team science will be defined as team members who cross natural or traditional academic or industry boundary lines to combine their disciplines into one effort for the development of integrated knowledge. Team science as a term in this paper does not refer to doing hard science as a group, but rather the science of a group of individuals working as a team. The Science of Team Science (SciTS) field has been established to address questions relating to science teams such as funding and scientific strategy, because there have been few studies focused on the science of team science (Hall et al., 2018, p. 1). Working across disciplines can require flexibility and a "particular form of social intelligence" prerequisite to successful collaboration (Fiore, 2008, p. 252). Dissemination of this scoping review will be as follows: Abstract and Introduction sections to provide background, Methods section detailing the scoping review, Discussion of findings, and Conclusion.

## Methods

Arksey and O'Malley's (2005) five-stage framework is utilized for the purpose of this scoping review. The five stages consist of:

1. Identifying research questions
2. Identifying relevant studies
3. Study selection
4. Charting the data
5. Collating, summarizing, and reporting the results

**Stage 1: Identifying Initial Questions**

This research paper focuses on the identification of factors thought to contribute to successful interdisciplinary team science in the remote workplace.

1. How has team science changed amidst the pandemic?
2. With virtual working conditions in academe and industry, how does global diversity effect interdisciplinarity in team science?
3. What topics are manifesting as trending patterns in team science?

To address these timely and globally applicable research questions, the authors conducted a literature review in March of 2021 to scope the social science research behind interdisciplinary team science.

**Stage 2: Identifying Relevant Studies**

The scope of the review was limited to a 5-year period (2017-2021) and focused on peer-reviewed articles available in the JSTOR and WOS databases. JSTOR was selected for its hosting of current journal articles in the social sciences, and WOS for its core collection of six databases, including Emerging Sciences Citation Index and Social Sciences Citation Index. Using the key search term 'team science' in the JSTOR database on March 16, 2021, 37 articles were located. Using the key search term 'team science' in WOS on March 14, 2021, 20 articles were located. A review of the titles and abstracts in both databases revealed that a large number of articles were irrelevant, particularly those which focused on medical team science since it is largely done in-person and falls outside the scope of this project, or those papers which did not include cross-discipline collaboration. Table 1 summarizes the criteria for inclusion and exclusion. Figure 1 is a graphical representation of study selection. After review, 15 articles were determined to be relevant for analysis.

| Criteria | Inclusion | Exclusion |
|---|---|---|
| Time period | The last 5 years (2017-2021) | Studies outside these dates or time period |
| Study focus | Remote working | Studies carried out informally |
| Literature focus | Peer-reviewed studies relating specifically to academic and industry remote working outcomes | Research relating to medical or traditional in-person work |
| Sample | Teams continuing to work through the pandemic in academic or industry settings where a cross-discipline work force is integrated in a satisfactory way remotely | Informal team building, leadership summit, and all other informal sample which provide no remote scientific basis for team science across disciplines |

**Table 1**: Scoping Review Search Parameters

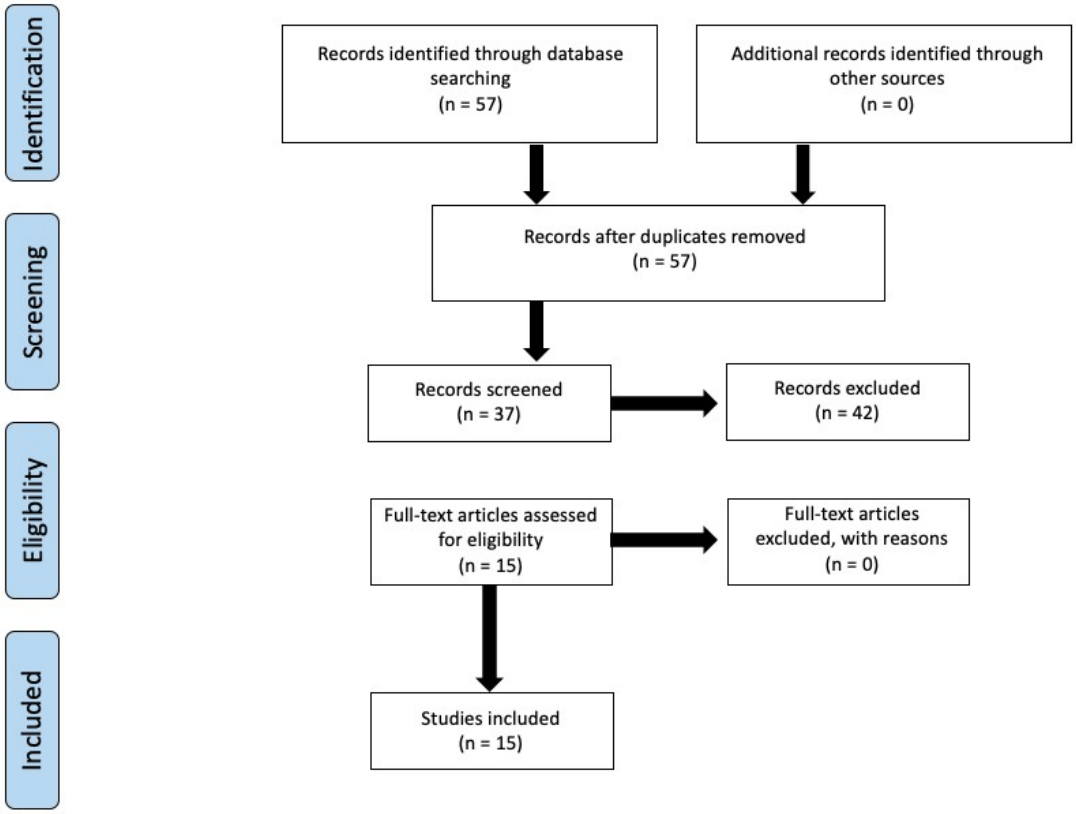


**Figure 1**: Study Selection

## Results and Discussion

The relatively small number of relevant articles gives importance to the growing nature of interdisciplinary team science. Fiore's (2008) definitive claim is especially poignant in light of the malnourished literature when he states, "interdisciplinary science is team science – it is team science because it is infeasible to conduct interdisciplinary research independently" (p.272). The literature is inconclusive with information on team science in interdisciplinary settings, however the authors have confidence in the methodology of team science for interdisciplinary teams. Following the review of included literature, four topics were identified as particularly relevant to this scoping review with the research focusing on which factors contribute to successful interdisciplinary team science in the remote workplace: diversity, leadership, curriculum, and participative safety.

### A. Diversity

Differing skills and backgrounds within a team set the stage for rich collaboration and an extended knowledge base. Diversity is the trend forward as remote working conditions become normalized and teams subsequently become more globally inclusive (Hampton et al., 2017, p. 555). A second emerging diversity is diversity of disciplines. A study conducted by Alessa et al (2018) used an ecological-social interdisciplinary outreach to expand a team's knowledge base. The diversity of the disciplines was found to aid in identifying challenges and move toward problem solving (p. 9). The next trend is leadership in a remote interdisciplinary team setting.

### B. Leadership

The need for efficient leadership is key to guiding diverse global teams, which potentially span cultural and socioeconomic populations. Communication networks and conflict resolution strategies are part of interpersonal processes among interdisciplinary teams. Intentional and consistent leadership not only diminishes bias, it can also increase teamwork satisfaction for team members (Nielsen et al., 2017, p. 1742). Satisfied employees are more likely to be creative and innovative. Resilience in team leadership has an impact on team performance (Johnston et al, 2019, p. 11).

### C. Curriculum

Benefits of team science across disciplines are evident in remote working conditions. However, literature is bereft of team science curriculum. Very few studies have undertaken team science curriculum trainings, even though interdisciplinary research activities are increasingly used and touted. Training the next generation of academics and professionals in interdisciplinary collaborative team science could promote innovation (Dietze et al., 2018, p. 1429). While there is no standardized curriculum on team science, the authors located a professional development program which focuses on team basics such as communication and collaboration called Enabling Interdisciplinary and Team Science www.aibs.org/events/team_science_event.html (Gropp, 2017, p. 947, Gropp, 2017, p. 103). The lack of team science curriculum has the potential to expose "feelings of cross-disciplinary inadequacy", however there are team science strategies for supporting participative safety (Allison et al, 2017, p. 2).

### D. Participative safety

Cultivating a culture of respect and safety for members to express ideas collaboratively allows the team a sense of psychological and emotional safety and is more fertile ground for innovation. As team sizes expand to embrace a global membership, participative safety concerns expand in direct proportion. Small and seemingly inconsequential actions such as making eye-contact albeit remotely, may provide "a sense of inclusivity" and add to participative safety (Hampton et al., 2017, p. 62). It is an emergent trend in the literature that a focus on the psychological well-being of the team is important for participatory collaboration (Tebes, 2018, Tebes & Thai, 2018). As team science has grown, another facet of participatory safety has emerged with a call for due credit authorship (Jabbehdari & Walsh, 2017, p. 875). A case study from Penn State College of Medicine illustrates that team science can be threatened when participating team members are not given credit for group projects (Davies, 2017). In section summary, supporting the emotional safety and well-being of participating team members has been identified as a possible factor in successful problem solving and innovation of team science.

## Conclusion

This paper identified possible contributing factors of team success across disciplines while working remotely. The identified topics are diversity, leadership, lack of team science curriculum, and participative safety. The trends in the literature of the last five years point to an increasing growth of interdisciplinary team science. On the basis of this scoping review, future research suggestions center around diverse disciplinary perspectives as the opportunities for global collaborative team science continue to trend upwards. Additionally, opportunities for further research include longitudinal evaluation of trends to understand how various factors may shape the future of team science in the workplace.

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