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## **Jigsaw Effects on Student Learning Outcomes: A Review**

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### **Abstract**

Although cooperative learning strategies provide promise for creating schools that are welcoming to students of all backgrounds, they have not been generally adopted. The Jigsaw system is popular because it is thought to promote students' sociability and learning, and because it seems to be straightforward to apply and follow its four-step teaching framework. A comprehensive assessment of research that has investigated the effects of the Jigsaw method on crucial student educational outcomes was planned and carried out to ensure precise identification of the method's effects. After conducting inductive and deductive topic analyses on 10 Jigsaw studies, three key outcomes emerged: learning (including accomplishment and motivation), social relations, and self-esteem (including academic and social self-esteem). Jigsaw's effects on academic performance ( $n = 2$ ), motivation ( $n = 1$ ), social connections ( $n = 1$ ), and self-perception in the classroom ( $n = 1$ ) were quantified wherever feasible via supplementary reviews. With the exception of social self-esteem, for which only three studies concluded that the Jigsaw method had positive effects, the primary results of our review focused on the inconsistency of Jigsaw effects and the high degree of variability among studies with regard to all retained student educational outcomes (i.e., achievement, motivation, social relations, and academic self-esteem). Additionally, the findings were consistent across trials. Our analysis sheds light on a number of variables that may account for this variation in research, including sample size, student diversity, and curriculum. The moderating effects of these variables need empirical investigation since they may lead to more effective applications of the Jigsaw technique.

**Keywords:** learning methods, Jigsaw technique, student, creating schools, assessment

### **Introduction**

International educational standards prioritize inclusive schools (Hesjedal et al., 2015), and cooperative learning approaches (Vakilifard et al., 2020) are shown to be helpful in promoting inclusion. Cooperative learning, where people engage and learn together, is a promising educational technique (Cochon Drouet et al., 2023). It allows students to collaborate and use their friends as a valuable learning resource. Cooperative pedagogies provide unique perspectives on improving socialization and learning. Scientific data supports cooperative

learning, but classroom practices differ significantly (Deci & Ryan, 2000). Group work accounts for <10% of classwork in American schools. This may be due to instructors' lack of confidence in implementing cooperative learning (Phuntsho & Gyeltshen, 2022), the complexity of cooperative learning concepts (Bächtold et al., 2023), insufficient training, or concerns about altering methods. The Jigsaw technique is a popular cooperative learning approach for instructors due to its simple four-step structure. The Jigsaw technique is a well-researched and popular cooperative learning approach (Millis, 2023). This paper aims to (1) review existing research on the Jigsaw method in education, (2) analyze its impact on key student outcomes, and (3) suggest future research and practical guidelines for its implementation.

A comprehensive study was done to determine the educational results linked to the Jigsaw technique (Safkolam et al., 2023). We conducted a supplementary review of each identified outcome variable to quantify Jigsaw effects (Melinamani et al., 2017) and their variability across trials. We sought to find characteristics that may explain such possible unpredictability. After reviewing existing research and theories, we examined five factors: sample size, discipline taught, student age, implementation time, and student diversity.

## **Literature Review**

To validate the Jigsaw approach in existing and future teaching practices, we must go beyond intuitive assumptions and accurately define its impacts. The research found promising results in particular success outcomes (Stanczak, 2020), but practical judgments should evaluate all educational outcomes of the Jigsaw technique (Ural et al., 2017). Further analysis is needed to address the high variation and dispersion in student accomplishment studies identified by (Stanczak, 2020). We must assess whether this heterogeneity is present in other educational outcomes and uncover reasons that may explain it across studies. Understanding the elements that affect Jigsaw's influence on educational results is critical for improving the technique. This paper aims to (1) review existing research on the Jigsaw method in education, (2) identify its effects on student outcomes, and (3) improve understanding of its heterogeneity, with the goal of proposing future research and guidelines for its implementation. One research question was posed in this study: How does the jigsaw approach impact educational outcomes?

## **Methods**

The systematic review and meta-analyses adhered to PRISMA standards for publishing meta-analysis results (Moher et al., 2009). Relevant studies were identified using Google Scholar and Scopus databases. The term “Jigsaw” was combined with the following keywords using the Boolean connector “AND”: Jigsaw AND Education. The whole procedure was executed in September 2023.

## Result and discussion

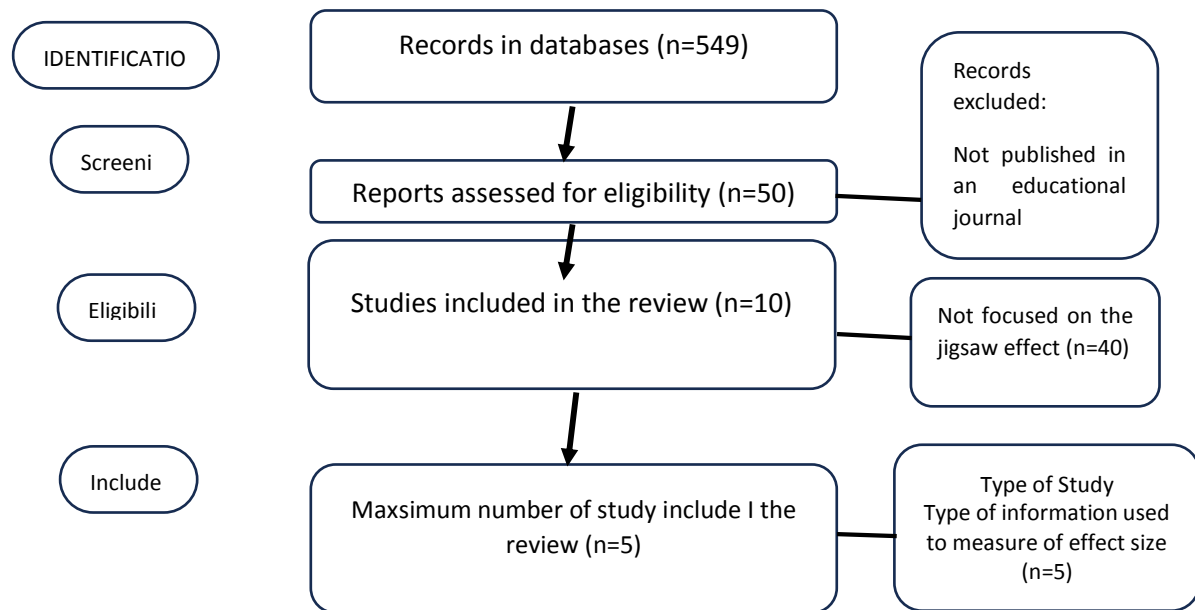


Figure 1. Prisma flowchart of the identification process of the review (n=5).

Table 1. Estimated size and characteristics of students' achievement in English Discipline

Study	Effect size	CI	Sample	Study weight	Population	Duration (hours)
Gömləksi'z (2007)	2.38	[2.09, 2.67]	66	2.09	UNI	28
Namaziandost and Gilakjani (2020)	1.09	[0.89, 1.25]	50	2.31	SS	20
Hornby (2009)	0.76	[0.58, 0.94]	44	2.31	UNI	2
Souvignier and Kronenberger (2007)	-0.48	[-0.52, -0.44]	208	2.63	PS	15
Stanczak et al. (2022)	-0.04	[-0.30, 0.2]	252	2.63	SS	2

In this study, we recommended doing a mixed-method evaluation of previous research that looked into how the Jigsaw technique affects the results of students' work. The goals of the study were as follows: (1) to assess the current state of the art with respect to these impacts on the educational outcomes of students; (2) to increase our knowledge of these effects; (3) to highlight future areas of research and assist instructors in more successfully using the Jigsaw method; and (4) to improve our understanding of these effects.

This review produced its initial output in the form of 69 Jigsaw studies that investigated the impacts of the program on student learning, socializing, and self-esteem. These are all very significant sorts of educational outcomes. Even though improving social interactions was the original purpose of the Jigsaw approach (Aronson & Patnoe, 2011), the majority of research concentrated on improving academic performance.

It would seem that the sample size is a component that determines the effectiveness of the Jigsaw technique for a variety of different outcomes (Blajvaz et al., 2022). It does not seem that the subject matter being taught, the ages of the students, or the length of time that the Jigsaw approach has been implemented are variables that impact the outcomes for the kids. In conclusion, the variety of the pupils and the material that is being taught are both elements that have an impact on the results of using the Jigsaw approach.

The findings of this study provide insight on the circumstances and elements that make it possible for the Jigsaw approach to "work" and produce desirable outcomes in terms of student performance, motivation, social connections, and self-esteem. Roseth et al. (2019) placed an emphasis on the fact that the Jigsaw method is a framework that develops a variety of different kinds of interactions between people. According to (Roseth et al., 2019), the phases of the expert group and coteaching seem to be especially perceptive with respect to the application of the Jigsaw approach and might be sources of variation across research.

## **Conclusion**

The Jigsaw method literature accurately reflects the challenges of the replication crisis, considering the significant heterogeneity of results, large effect sizes, and influence of sample sizes. This suggests the necessity for better studies, preregistrations, and thorough study questions. Besides enhancing "Jigsaw implementation" per se, this approach is crucial for overcoming the replication dilemma. Researchers should examine the implementation of pedagogical structures in other contexts, particularly the Jigsaw method's impact during expert group and coteaching phases, which may be crucial. To provide inclusive education, cooperative techniques must be accessible to everybody. This may be done via smart teacher training.

## **Conflict of interest**

The authors state that the study was done without any possible conflicts of interest due to commercial or financial affiliations.

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