

Evaluating Brain to Brain Synchrony in the Classroom through the Theory of Mind.

The “Mind in Mind laboratory” Research Project

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A. Introduction

Brain-to-Brain synchrony refers to the coordination and alignment of brain activity between two or more individuals during social interactions or shared experiences (Hasson, 2012). This phenomenon, which involves the simultaneous activation of similar brain regions and neural networks, enabling individuals to establish a deeper connection and greater mutual understanding, has also aroused renewed interest in the field of pedagogy, as the processes of **inter-brain synchrony** are said to be particularly influential in the context of the relationship between teacher and student and on learning outcomes. Numerous studies have shown that synchronised neural activation would take place between subjects mainly in regions associated with **Theory of Mind** (ToM) (Hoffman,2016; Baron-Cohen,1985).

B. Hypothesis

It was hypothesised that the Mind in Mind laboratory project could increase teacher-student and peer synchronisation.

It is expected that the performance on synchrony, empathy, cooperation, self-regulation and mentalisation skills of university students could increase significantly.

C. Methodology

A series of teaching activities, constructed using the Student Team Learning working methodology (Slavin,1991), was implemented. A quasi-experimental design with a single group with pre- and post-tests was employed, with a convenience sample of 160 students attending the Evaluation Science laboratory, Degree Course in Pedagogical Sciences at the University of Palermo in the A.A. 2023/2024.

E. Analysis

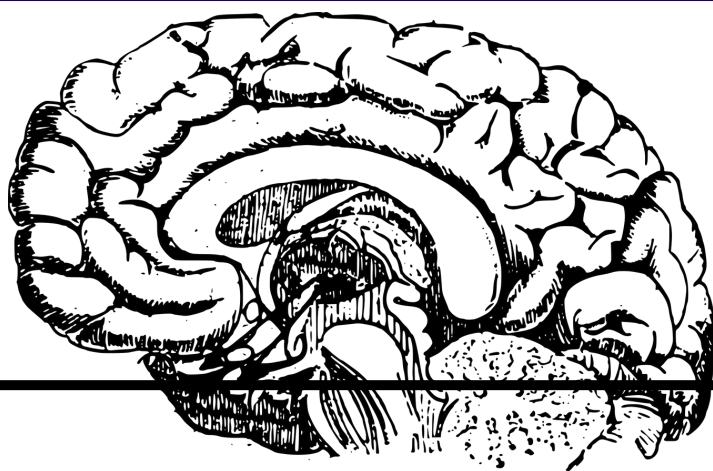
In order to assess whether the Mind in Mind Laboratory had significantly affected the dimensions identified by the questionnaire, a **paired t-test** was conducted to co-compare the results of the pre- and post-test scores of each area.

Before oprating the t test, a normality test was performed to verify the sample distribution was normal through the **Shapiro-Wilk Test**.

Given the limitations of a quasi-experimental design, the significance of the analysis results cannot be generalized with certainty.



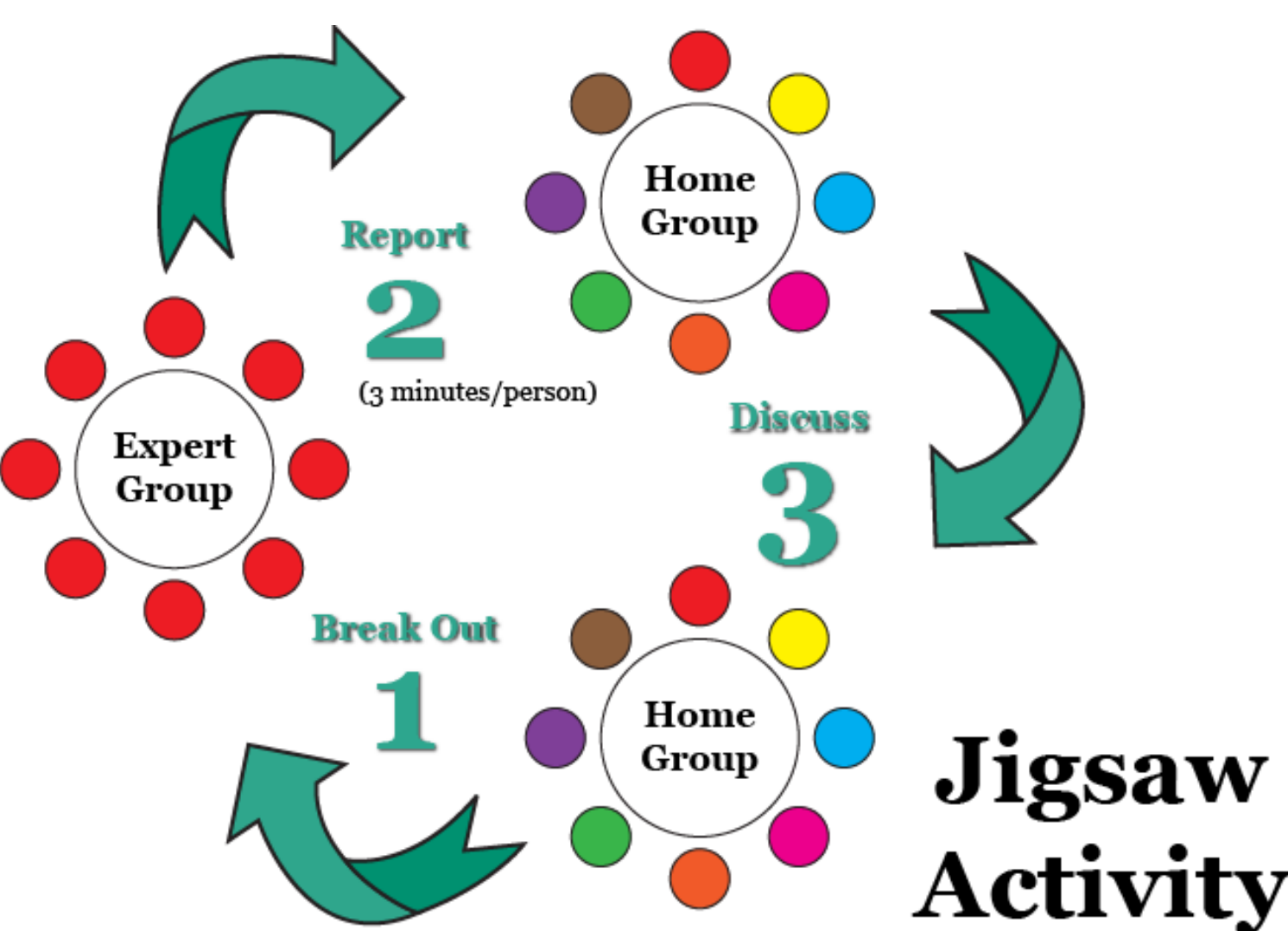
D. Insights



Goals and Phases of Cooperative Work

General objective: cooperation and distribution of individual responsibility with respect to the task; complete the specific objective; carry out the meta-analysis for product improvement.

	What the teacher does	What the student does	Note
Step 1 - 15 min. Before the activity	Exposes the task and gives the assignment, allocating the students within the groups and assign the specific tasks (segments); accommodates doubts and questions.	Listens directions; forms the group; chooses the leader for discussion with the teacher	Jigsaw Segments: in relation to the task, it is necessary to establish which specific segments each student within the mother group will complete in accordance with their own characteristics and skills
Phase 2 - 30 min. activity	Monitor the first phase	works cooperatively within the mother group	
Phase 3 - 30 min. activity	Provides and explains the meta-reflection scheme accompanying the activity; welcomes doubts and questions.	Adopts and fills out the tool provided by the teacher to initiate metacognitive reflection and evaluation.	
Step 4 - 15 min. activity	Monitor the second phase	Expert Groups meet to exchange information	Each expert compares with other experts in the field to exchange strategies and ways of working
Step 5 - 30 min. activity	Monitors and supports the development of the third phase	"Mother groups" rebuild and produce the product	
Step 6 - 60 min. After the activity	Evaluates products and adjusts peer review	Classroom display of the product; self-assessment.	Each group evaluates the products created according to evaluation criteria provided by the teacher



QToM Test Area's

Empathy	• Accurate understanding of others' moods facilitates emotional tuning in (Shamay - Tsoory, 2009)
Cooperation	• Two crucial aspects: facilitating the establishment of a climate of mutual understanding and gaining advantageous positions within group dynamics (Davis, 2003; Slaughter, 2003)
Self-regulation	• Executive functions (including inhibitory control and self-regulation) rise to crucial components in calibrating one's behavior in a complex society
Mentalization	• Refers to that specific subcomponent of ToM that denotes the act of " reading" one's own and others' feelings and reflecting on oneself

F. Results

The t-test revealed a signifint difference in the post-test scores for **cooperation** ($t = 2.15, p = 0.04$), indicating a moderate effect size and also a significant change in the post-test scores for **mentalization** ($t = 1.98, p = 0.056$), suggesting a small to moderate effect.

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References

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