Reflection on the Jigsaw method

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Attending the IASCE cooperative learning strand at the recent IAIE conference, I noticed that several CL workshops engaged participants in various applications of the jigsaw method. I would like to share my reflections on jigsaw because it represents a type of cooperation but may raise some questions regarding learning. It reminded me of a personal experience when I was a young French PhD student participating in a jigsaw exercise during a CL workshop in the U.S. on a very American topic. I did not know anything about the topic and I was the only non-English speaker in the room. I was somewhat embarrassed to have to read a text (in a very short time) and to have to explain it properly to my partners who relied on me. This experience led me to reflect on the choice of jigsaw activities in some workshops at the IASCE strand where international participants have to explain texts to some experts in the field who are also participating in the workshop. As a researcher, I can't help connecting personal reflection and research.

Jigsaw (Aronson & Patnoe, 2011; Blaney, Stephan, Rosenfield, Aronson, & Sikes, 1977) is a very popular cooperative method that relies on positive goal and resource interdependence. The website https://www.jigsaw.org/ sums up the different stages by which each student in a team is responsible for learning a part of the material and teaching it to other members of the team, so that finally each member learns all parts. Positive resource interdependence underlines the need to coordinate the different pieces of knowledge in order to get the whole picture. This method elicits cooperation as an appropriate way of interaction, and strengthens the relevance of the relationships with the partners (Aronson & Patnoe, 2011; Cohen & Cohen, 1991). The website emphasizes that most teachers find jigsaw easy to learn and enjoy working with it.

Jigsaw was introduced in the United States at the time of desegregation, with the hope that cooperation and interdependence would ease tensions and inter-group hostility. Indeed, research indicates that jigsaw classrooms enhance several outcomes, including students' involvement and interest in the material, self-esteem, school and groupmates' appreciation (Aronson & Patnoe, 2011; Blaney et al., 1977), as well as experience of competence, autonomy, and social relatedness (Hänze & Berger, 2007), self-regulated learning and academic motivation (Sanaie, Vasli, Sedighi, & Sadeghi, 2019), perceived educational value and enjoyment (Oakes, Hegedus, Ollerenshaw, Drury, & Ritchie, 2019).

However, the picture may be more ambivalent regarding learning. On the one hand, numerous studies have documented positive effects of resource interdependence on learning (Johnson, Johnson, & Stanne, 1989; Lambiotte et al., 1987; Tarhan, Ayyıldız, Ogunc, & Sesen, 2013; Tarhan & Sesen, 2012; Walker & Crogan, 1998), especially for the part where students become "experts" (Hänze & Berger, 2007; Souvignier & Kronenberger, 2007). On the other hand, alternative results may question this positive view. The benefits of jigsaw may vary for different kinds of students, with positive effects documented only for certain students, namely minority students (Blaney et al., 1977, see also Aronson & Patnoe, 2011) or students with low academic self-concept (Hänze & Berger, 2007). Slavin's review (1990) underlined that the effects of jigsaw on learning remained unclear, as a great variability can be noted (effect size from -0.51 to +1.41, median = +0.04, N = 9, Slavin, 1990) and Johnson and Johnson (2002) indicated that jigsaw failed to show a significant difference compared to individual learning (average effect = +0.13 and weighted effect size =+0.09, N = 5). Some studies failed to demonstrate any jigsaw benefits for learning (Box & Little, 2003; Lazarowitz, Baird, Hertz-Lararowitz, & Jenkins, 1985) and others emphasized that students' learning benefited less from jigsaw than from teacher-guided instruction (Souvignier & Kronenberger, 2007) or lectures, even if students appreciate the jigsaw experience (Wilson, Pegram, Battise, & Robinson, 2017).

Some arguments can help to understand difficulties learning with jigsaw. In line with Slavin (1995), we would like to stress that jigsaw is very demanding for students. First, they are required to play the teacher role for one stage, but they may experience difficulties in understanding the content in a limited time and find the way to teach it in a way other students may understand it. Resource interdependence may focus participants more on

transmitting and receiving information than on elaborating on the materials, which can explain poor learning gains (Moreno, 2009). Some students report a cognitive load and may feel pressure to perform as teachers, and experience uncertainty (Oakes et al., 2019).

Secondly, students are dependent on their partners' input to access all the material. Some research results underlined that students performed worse on the learning materials that they had learned from their partners (Souvignier & Kronenberge 2007). The difficulty of the material or texts (Buchs, Butera, & Mugny, 2004) and the quality of informational input is crucial for students' learning (Buchs, Pulfrey, Gabarrot, & Butera, 2010). It may be problematic whenever partners find it difficult to explain the material well, as it can be when people do not master the official language. In the case of poor informational input, learners can find it difficult to understand material their partners "teach," and positive interdependence can turn into negative interdependence. Roseth and colleagues underline that jigsaw elicits cooperative, competitive, and individualistic goals and simply distributing resources among jigsaw group members does not result in optimal outcomes (Roseth, Lee, & Saltarelli, 2019).

Keeping all these points in mind, it seems that some caution is needed when proposing jigsaw in order to sustain students' learning. Teachers may need to make sure that all students understand the content and succeed in teaching it in an appropriate way for their partners. This requires particular attention in elementary schools (Aronson & Patnoe, 2011; Souvignier & Kronenberger, 2007), but difficulties have been also reported in higher education. To conclude, as for many cooperative learning situations, students need to be prepared before jumping into jigsaw. Setting the stage for cooperative learning is important (Sharan, 2014).

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