



Group becomes an expert on one topic, which

to the other members of the group. Students are encouraged to do well on the quiz, and to know their own topic well. Students are encouraged to pay close attention to the other members of the group and encourage them to do the same with the material.

Four decades of research have supported the Jigsaw Classroom as an effective way to complement the Jigsaw Classroom. The Jigsaw Classroom can accomplish its primary intention of reducing students' prejudice (Aronson, 2004; Aronson & Bridgeman, 1979; Osherow, 1980; Levy, 1980; Rosenthal, 2017; Paluck & Branstetter, 2015), though not without exception (Aronson, 2004). This success in reducing prejudice is due to the fact that the Jigsaw Classroom rates several key features of the Jigsaw Classroom: group tensions via contact, because the Jigsaw Classroom is a group, and because, in the Jigsaw Classroom, each student learns

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quizzes and exams compared with those who are taught via traditional lecture (Saville, Zinn, Neef, Van Norman, & Ferreri, 2006) and that the benefits of interteaching are even greater for students with low GPAs (Saville, Pope, True-love, & Williams, 2012). A meta-analysis of active learning found that in addition to improving exam scores, active learning techniques, like peer instruction and interteaching, also reduced failure rates in undergraduate STEM courses (Freeman et al., 2014). Unlike the Jigsaw Classroom, Peer Instruction and Interteaching do not make students interdependent. Thus, although Peer Instruction and Interteaching are clearly effective strategies for improving student performance in college classes, they would not be appropriate methods for instructors who had the dual goals of decreasing prejudice and improving academic performance. In fact, previous research has shown that merely engaging in group work without being interdependent is unlikely to yield the same positive effects on prejudice reduction (Walker & Crogan, 1998).

In addition to embracing the tenets of cooperative learning, the Jigsaw Classroom may also accurately be described as a form of peer tutoring. Research on peer tutoring shows that both tutors and tutees benefit academically from the experience (Devin-Sheehan, Feldman, & Allen, 1976; Le Boeuf, 1968; Topping, 1996). More important, both low- and high-achieving students benefit from tutoring others (Devin-Sheehan et al., 1976). In addition, participation in a tutoring program decreases absenteeism (Devin-Sheehan et al., 1976) and improves attitude toward the material (e.g., Leland & Fitzpatrick, 1993). Tutees are also less likely to be left behind or assigned to special education classes (Devin-Sheehan et al., 1976). Furthermore, the use of peer tutors in the Jigsaw Classroom might circumvent some of the problems associated with using tutors who are not members of the class (e.g., Colvin, 2007).

Folk wisdom tells us that “to teach is to learn twice,” or *Q D ce D, c*, which is Latin for “she who teaches learns.” Thus, the benefits of peer tutoring for the tutor seem to come from “learning by teaching” (Topping, 1996), but exactly how does this process work? Tutoring requires tutors to simplify, clarify, and exemplify the material—all techniques that should aid in later recall. Indeed, experimental subjects who believed they would have to teach studied

material to another student performed better on a quiz compared with those who studied only to learn the material for themselves (Bargh & Schul, 1980). These results suggest that students process the material differently when they expect to teach it versus simply being tested on it. Annis (1983) replicated the results of Bargh and Schul (1980) in a classroom setting while consistently maintaining length of exposure to

eh79it.the1(4)-23

performance. Although the Jigsaw Classroom was developed by a social psychologist and is often discussed as a prejudice reduction tool, to our knowledge this is the first reported use and evaluation of the technique in a social psychology course. Incorporating the Jigsaw Classroom into a social psychology course has the added benefit of providing students with hands-on experience with one of the prejudice-reduction techniques they will learn about later in the course.

Methods

Participants

Participants were 126 students (92 females, 34 males) enrolled in one of four sections of a 200-level Social Psychology course between fall 2013 and fall 2016 at the University of Scranton. The University of Scranton is a mid-sized Catholic and Jesuit coeducational liberal arts university located in Northeast Pennsylvania. Approximately 78% of the student population identifies as white. The sample was a mix of freshman (20.63%), sophomores (29.37%), juniors (21.43%), and seniors (28.57%). The majority of the students were psychology majors (61.11%) with the remainder coming from 23 different majors, including exercise science, neuroscience, counseling, and biology. All sections were taught by the same instructor.

Materials and Procedures

All students completed two jigsaw activities. The first activity covered the subject of attributional biases. This activity included the topics actor–observer effect, fundamental attribution error, and the self-serving bias. The second activity covered the subject of group dynamics. This activity included the topics brainstorming, group polarization, and groupthink.

For the first jigsaw activity on the subject of attributional biases students received a double-sided handout on their assigned topic. Each handout included a photocopied excerpt from an earlier version (Aronson, Wilson, & Akert, 2010) of the introductory social psychology textbook that they had purchased for the class. The handout on the actor–observer effect included a definition of the concept along with an example and a discussion of the roles of per-

ceptual salience and information availability in explaining this bias. The handout on the fundamental attribution error (correspondence bias) provided a definition and an example of the fundamental attribution error along with a description of the “Castro Study” conducted by Jones and Harris (1967). The handout on the self-serving bias provided a definition of the self-serving bias, a discussion of why we make self-serving attributions, and connected this topic to research on the just-world phenomenon and blaming the victim.

For the second jigsaw activity on the subject of group dynamics, students received a one-page instructor-generated handout on their assigned topic (available upon request). The brainstorming handout provided a summary of the study by Taylor and colleagues (1958), a summary of explanations for why groups generate fewer ideas, and a description of brainstorming as an alternative to brainstorming. The group polarization handout provided a brief summary of research on the risky shift, several empirical examples of group polarization, and two possible explanations for why group discussion leads to polarization. On the reverse of the group polarization handout were two decision dilemmas that could be used to illustrate the difference between group polarization and the risky shift. The groupthink handout identi-

understandings. When they were done meeting in their expert groups, students moved into their jigsaw groups. Like a jigsaw puzzle, students must present their piece to have an understanding of the “big picture” of the broader subject.

Students in all four sections completed both jigsaw activities and were tested on the topics associated with both attributional biases and group dynamics. However, the timing and format of the evaluations differed across the four sections. See [Table 1](#) for a summary of assessment activities for each section. In Section 1, students were tested with three multiple-choice questions on the subject of attributional biases on their first exam. On their second exam, stu-

choice of essay topic was significantly different than what would be expected by chance, $\chi^2(4) = 25.27, p < .001$ (see Table 2 for absolute and relative frequencies). Most students (51.85%) selected the topic of brainstorming, followed by group polarization (29.63%). Groupthink was the least popular selection for the short essay (18.52%). Closer examination of the results showed that students had a clear preference for writing on the topic they had been assigned (62.96%). Almost all of the students who had been assigned the topic of brainstorming chose to write their short essay on that topic (94.11%), and 57.89% of students who had been assigned the topic of group polarization chose to write their short essay on that topic. Although only 41.18% of students assigned the topic of groupthink chose to write about it, these students represented 70% of those who chose to write an essay on this least popular topic.

Student Performance

We predicted that students would perform better on their assigned jigsaw topic, compared with those not assigned to that topic. Support for this prediction would be evidenced by a two-way interaction between the student's assigned jigsaw topic and the topic being tested. For analyses on both subjects (i.e., group dynamics and attributional biases), tested topic was a within-subjects variable whereas assigned jigsaw topic and type of assessment (quiz vs. exam) were between-subjects variables.

Student Performance: Group Dynamics. A 3 (assigned jigsaw topic: brainstorming, group polarization, groupthink) \times 3 (tested topic: brainstorming, group polarization, groupthink) \times 2 (assessment type: quiz vs. exam) mixed-model ANCOVA was used to test for differences in student performance. Final grade in the course was used as a covariate and was significant, $F(1, 81) = 28.72, p < .001$. Results showed the predicted two-way interaction between assigned jigsaw topic and the topic being tested, $F(4, 162) = 3.69, p = .007$.¹ Students assigned to a jigsaw topic performed better on the short-answer question related to that topic, compared with those not assigned to that topic (see Figure 1). For example, students who had been assigned to teach their classmates about brainstorming performed significantly better on a short-answer question

on that topic, compared with students who had been assigned to teach about group polarization or groupthink. This was true for all three topics regardless of whether they were tested on a quiz or an exam.² There was also a significant interaction between the assessment type and the topic being tested, $F(2, 162) = 3.10, p = .05$. On the exam, students performed best on the question related to groupthink, whereas on the quiz they performed best on the question related to group polarization. The main effects for tested topic, assigned jigsaw topic, and the three-way interaction between tested topic, assigned topic, and assessment type were not significant: $F(2, 162) = 1.62, p > .05$; $F(2, 81) = 1.60, p > .05$; $F(4, 162) = 0.18, p > .05$, respectively.

Student Performance: Attributional Biases. A 3 (assigned jigsaw topic: actor-observer effect, fundamental attribution error, self-serving bias) \times 3 (tested topic: actor-observer effect, fundamental attribution error, self-serving bias)

differences between those assigned to teach the topic versus those who were not. Overall, students performed well on the multiple choice questions. A high percentage of students answered the multiple choice questions about the actor–observer effect (74.73%), fundamental attribution error (84.62%) and self-serving bias (90.11%) correctly. Unlike students' performance on the short answer questions, results showed no difference in performance between those who taught each topic versus those who did not on the multiple choice exam questions about the actor–observer effect, fundamental attribution error, and the self-serving bias (Fish-

their enjoyment. Only four students (12.9%) explicitly said that they did not enjoy learning from their classmates and the remainder (45.16%) were ambivalent. Many of these students did not trust their classmates to present the material well and were concerned that classmates might be “explaining something wrong.” When asked how they thought the activity could be improved, students cited concerns about noise level and several requested that they receive copies of the handouts for all assigned topics.

In Section 3, students ($n = 34$) completed a structured feedback form that included measures of their attitude toward the jigsaw activity about attributional biases, ratings of how well they understood each topic, and how well they felt each topic was taught (see [Appendix](#)). Attitude toward the jigsaw activity was measured with 10 items (e.g., “I liked the jigsaw activity”), and students made their responses on a 5-point scale ranging from 1 (not at all) to 5 (very much). The aggregated scale had high internal consistency reliability (Cronbach’s $\alpha = .91$).

literature on peer tutoring, our results showed that participating in the Jigsaw Classroom served to increase students' confidence and mastery of their assigned jigsaw topic as evidenced by the fact that (a) when given the option, a majority of students (62.96%) preferred to write about their assigned jigsaw topic; (b) students asked to recall information about their assigned topic performed better than those not assigned to that topic both on quizzes that followed soon after the jigsaw activity as well as on exams that occurred at a delayed time; and (c) students self-reported understanding their topic better compared with those not assigned to that topic. Interestingly, no meaningful differences were found on (the relatively easier) recognition-based multiple-choice exam questions.

One possible explanation for why students show improved recall for their assigned jigsaw topic is that teaching (and preparing to teach) the material to others provides an opportunity for students to elaborate on the material (Annis, 1983). That is, to effectively teach their assigned topic to others, students are likely to follow the three-step theory of verbal learning. They must (a) pay attention to the material, (b) make the material personally relevant, and (c) relate the new material to material already stored in memory (Anderson, 1970). Research on cooperative learning has shown that students who benefited most from cooperative activities were those who provided elaborated explanations to others (Webb, 2008 as cited in Slavin, 2011).

The results of the present study may also

Jigsaw II, students read about all of the topics but are assigned to become an expert on one. Students take individual quizzes which are then used to create a team score. Teams that score above a certain threshold receive some sort of reward (e.g., certificates, extra credit, etc.).

Another suggestion for future research would be to dismantle the teaching role in the Jigsaw Classroom into its two component parts, preparation to become an expert and teaching the topic to others, to determine whether the relatively higher performance of students who taught a topic reflects a preparation effect, rather than an effect of teaching. This could be done by comparing the performance of students who participate in a full Jigsaw Classroom experience with those who are merely instructed to prepare to teach their topic. If the gains in

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Appendix

Student Feedback

For each statement, please circle the number that corresponds to the response that best reflects your opinion about the jigsaw classroom activity (1 = *strongly disagree*, 5 = *strongly agree*).

1. I enjoyed the jigsaw technique.
2. I would suggest that the instructor use the jigsaw technique in future semesters.
3. I wish more of my classes were in the jigsaw format.
4. The jigsaw class was a waste of time. (reversed)
5. I would recommend a class that is using the jigsaw format to a friend.
6. Overall, my classmates did a good job explaining class material during the jigsaw class.
7. I felt comfortable in class as a result of the jigsaw format.
8. I was more willing to participate in class as a result of the jigsaw format.
9. I wish this course had not included a class taught in the jigsaw format. (reversed)
10. I felt I got to know my classmates better as a result of the jigsaw class.

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