Title	When size doesn't matter
Author(s)	Nootan Rai and Sunarti Samsudin
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When Size Doesn't Matter

Teachers from CHIJ St. Joseph's Convent show us how you can have cooperative learning in the classroom with both big and small groups.

Research has shown that cooperative learning is a beneficial way to help students retain and apply the things they learn by getting them to work together in tackling challenging problems in the classroom (Johnson & Johnson, 1989). One way to encourage cooperative learning is through the jigsaw method.

Here, students are divided into small groups, where each person is assigned a specific role in completing a task. For example, if the assignment is about the human body, the first group member can take charge of understanding the nervous system, a second member can handle the cardiovascular system while the third can take care of the skeletal system. As a result, the only way other members of the group can learn about the topic is by listening and learning from each other.

In this action research, we decided to test two different jigsaw methods: the conventional small group jigsaw method (described above) and our modified "whole class jigsaw" method. By comparing pen-and-paper test results from two classes using two different jigsaw methods, we hoped to ascertain which method is a better cooperative learning tool.

How did we do it?
Two Secondary 3 Pure Chemistry classes were chosen to take part in this research. Both classes are academically strong in Chemistry and are open and receptive to new methods of teaching and learning. In each class, teachers divided students into groups of five.

In the first class, each group was asked to take charge of one sub-topic in the chapter on the Rate of Reaction. They were then given one lesson to discuss their subtopic and prepare the materials needed to teach it to the whole class. Some groups prepared PowerPoint presentations while others used the visualiser or whiteboard. Students also planned worksheets to reinforce learning. Each group was then given the opportunity to teach the class about their "area of expertise" until all the sub-topics in the chapter had been covered.

In the second class, each student in the group was given a number from one to five. Student 1 was assigned sub-topic one, student 2 was assigned sub-topic two and so on. So in a way, each student in the group was to be an "expert" in one sub-topic on Rate of Reaction.

Like the first group, the students were given a double period lesson to learn their topics on their own and prepare their teaching materials. The following lesson, each group member was given 20 minutes to teach the rest of the group their assigned sub-topic using worksheets and other teaching aids such as notes or mind-maps.

To determine whether there was a significant difference in the performance of students from the two classes, we made use of the following tests:

• ***Pretest (mid-year Pure Chemistry examination)***
This included topics such as separation techniques, atoms and bonds, chemical

calculations and the periodic table. Out of 100 marks, 40 were for multiple choice questions, another 40 were for structured questions and 20 were allotted for essay questions.

• ***Post-test***
For the post-test, teachers used a section of the class test on the topic of Rate of Reaction. This section had ten "structured-question" style items with a total score of 17 marks. The tests were marked by two teachers to increase reliability and minimise tester bias.

What we found out
For the pretest, the first class got an average of 64 points and the second class got an average of 60.7. For the post-test, the first class got an average of 68.7 and the second class got an average of 64.8. The first class increased their scores from the pretest by 4.7% while the second class increased their scores by 4.1%.

Based on these results, we conclude that there is no significant difference between the test scores of students who used the conventional small group jigsaw method and those that used the modified whole class jigsaw method.

These results tell us that we can use this alternative method of jigsaw to conduct our lessons with the assurance that student learning will not be compromised. It also proves that teachers can modify and come up with new cooperative learning strategies and activities as they may yield the same benefits as well-documented methods.

The results also encourage teachers to use and invent new and interesting teaching tools which cater specifically to their individual classrooms and subjects. This way, teaching and learning is enhanced for both teachers and students without compromising the academic results of the students.

Recommendations
There are two possible limitations of this research. First, there was a lack of validity testing on the test and exam items due to time constraints. Second, there may not have been enough time for the weaker students to comprehend each subtopic in the given 20 minutes.

In the future, more action research could be done on pair work or peer-teaching between two students to test whether they learn better in smaller or larger groups. Research could also be done on homogenous and heterogeneous ability groups to determine which type of grouping will help students perform better.

> Want to learn more about this action research? Download the full paper here.

About the authors
Nootan Rai and Sunarti Samsudin are both beginning teachers at CHIJ St. Joseph's Convent.

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