Contents

Strategy 5

Jigsaw

> *We must try to trust one another. Stay and cooperate.*
> — Jomo Kenyatta

Purpose

The *Jigsaw* strategy, developed by the eminent psychologist Elliot Aronson (2010), is an example of cooperative learning that contains within it an individualistic goal structure. The idea of *Jigsaw* is that each student in a cooperative learning group of, say, three students is responsible for peer teaching his or her companions a portion of the material that they all need to learn. Thus each student "teaches" one-third of the information, skills or whatever, and is "taught" two-thirds of the content. It is important that students do their best to teach their peers well because each member of a group is depending on the others. This has the potential to create a truly reflective environment in which students accept responsibility for helping each other learn.

In a study of 100 secondary students, Toumasis (2004) evaluated the effects of integrating cooperative learning strategies as a part of regular mathematics instruction. For this study, students worked in *Study Teams* where they read the mathematics lesson from textbooks, worked on specific problems and tutored one another. In addition, students spent time reflecting on the main points of the lesson at the end of each day and completed team assessments together. Overall, after working in cooperative groups, students in Toumasis's study reported fewer anxieties related to learning mathematics, greater motivation and increased use of their textbook as a source of information.

Procedure

When a *Jigsaw* group of students is assembled, it is crucial that each member has something tangible to contribute. This means preparation, an important step in any problem-solving process. The idea is that each student becomes an "expert" in one part of a whole task. So, if students are learning

about the three states (liquid, solid, gas) of water, each student in a *Jigsaw* group is assigned to inform the others about the properties of water in a particular state.

We recommend that in most cases you require students to write down clear notes or points they wish to cover during the group meeting. Any materials or illustrations also should be assembled in advance. This way, when the group comes together, the time is spent productively. Because each group will have three students, you need to make it clear that each person is to be given equal time to present. Of course, you should allow a few minutes for each group to converse informally, a sort of "warmup" time, and you should allow time at the conclusion of the presentations for the group members to do some reflective thinking about what they have learned.

There is an intermediate step that can greatly contribute to the success of the *Jigsaw* strategy. If the topic is tidal action, Step 1 is for each student to prepare his or her part of the presentation for the group. Step 2 brings students together (perhaps in groups of five to keep things manageable) who have studied the same thing. They are able to check with each other for accuracy, ideas, procedures and the like. This intermediate step helps to ensure more accurate presentations, and it gives each student a kind of rehearsal prior to his or her presentation. So, to return to our topic of tidal action, the students who studied causes will meet together briefly, as will those who studied effects and those who studied areas of extreme tides. When that step is completed, students are ready to rejoin their *Jigsaw* groups. In Step 3, the groups come together and teach each other so that all important points are covered. But keep in mind that in a class of thirty students, there is the potential for three groups of ten students to have each studied the same part of the lesson.

Outcomes

Jigsaw is included among the reflective strategies for bringing teaching, learning and assessment together because peer teaching is one of the best ways for students to learn and to become conscious of what they are learning. It is both teaching and learning at once. Jean Piaget (2000) concluded that children are more effective than most adults realise in teaching each other, especially if teachers provide some structure and support. This is so, Piaget claimed, because of a language issue, namely that greater syntactic compatibility is found within the peer group than exists when, for example, adults talk to children.

What this means in simple terms is that adult language is far more complex than children's language—a child or adolescent talking to peers does not take linguistic shortcuts, use sophisticated terminology, or assume years of experience. John Dewey (1997) once noted that one of the biggest problems in teaching is the false assumption by teachers of the extent of students' ex-

perience. This in no way diminishes the importance of your role as a teacher; it does, however, shift the centre of gravity from you to the students, making your job one of organiser and facilitator of learning rather than lecturer or presenter.

Differentiating *Jigsaw*

Combine *The Week in Review* (Strategy 3) and *Jigsaw* for an interesting and effective review activity. Instead of conducting *The Week in Review* as usual, assign one lesson objective to a group of students and have them create a new lesson for reteaching others. For instance, if Monday's objective was to describe and diagram a method for graphing linear equations, one group of students would be responsible for designing a new mini-lesson to revisit this concept. Likewise, each additional group of students is assigned a different objective according to the remaining days of the week and then these groups reteach that day's objective through some mini-lesson that they design. Use the figure titled *Jigsaw The Week in Review* (shown on the next page) to formalise the process. On the figure, students have space to describe the lesson they will be teaching as well as a section for notes as they experience the "new" lesson, taught by a different group of students.

Certainly, there are students in every class who learn at an unusually quick pace; we've all had such students at some time or another. Apply the underlying ideas of *Jigsaw*, which are dividing content into portions and having students teach one another, to create additional/enhanced assignments for students who are ready for more content. For example, let's say your class is studying photosynthesis and pretty much everyone has the basic concept down. Make a list of topics related to photosynthesis that have the potential to extend student thinking and connect to other areas. This list might include the Calvin cycle, water photolysis and light reactions. Assign these as research topics to students who need more challenge. Then, have these students create projects or presentations to share with the class.

From the Classroom

♦ *Key Idea:* Students develop an understanding of the properties of Earth's materials, such as soil.

♦ *Instructional Objective:* Students identify various components and consumers in a sample of compost.

♦ *Motivation:* What kind of interesting insects, worms or other creepy-crawly things have you seen?

♦ *Activity:*

- Materials: Representative sample of compost in several large buckets, magnifying glasses, microscopes, Berlese funnels along with all of the equipment for their construction such as empty jars, 1/2 centimetre mesh, rubbing alcohol and duct tape

- Steps:

  1. Gather the necessary materials a few days prior to conducting this experiment. Search the Internet for *Berlese funnel* for details about their construction and use. Visit your local topsoil yard or gardening store for compost.

  2. Fill Berlese funnels with compost, 1000 cubic cm or more, and collect organisms that filter down through the funnel, past the mesh screen, into the jar with alcohol preservative for three or four days.

  3. After collecting organisms from the funnels, organise students into groups of six or seven. You will need additional compost on hand, preferably fresh compost with plenty of components such as leafs, twigs and perhaps fungi.

  4. Assign each group the task of identifying and illustrating organisms or components from different trophic levels: For example, first-level organisms, including earthworms and bacteria, second-level organisms, including mould mites and protozoa, third-level organisms, including ants and centipedes, and fourth-level organisms, including organic residues such as leaves and grass.

  5. Equip students with the necessary tools for identifying organisms/components depending on their particular trophic-level assignment. For instance, students assigned the

job of identifying organic residues will need a large bucket of compost and trowels or other digging implements.

6. Have students record their findings on paper with illustrations and labels.

♦ *Reflective Assessment:*

• Example 1 (Divergent)

Reorganise students into groups of four. Each group has one member who examined a different trophic level of the compost. Have each student share his or her findings and have students duplicate each student's list of illustrations and labels on their own paper.

• Example 2 (Convergent)

Reorganise students into their original groups of six or seven to share and duplicate notes showing organisms and elements they discovered in each trophic level. Have each group prepare a poster showing a master list with illustrations of their findings. Then, call on each group to present their posters to the class.

Two Goals of School Life

> *The foundation of education is to raise children to be fine human beings.*
> — Shinichi Suzuki

People who set a limited number of strategically significant goals are generally far more successful in goal attainment than those who either have no stated goals or who have too many goals to track. This is true in politics, business, child rearing, school and any other walk of life. The keys are to have a limited number of goals, be certain that the goals you do have are worth believing in, and establish concrete ways of realising the goals.

We propose only two goals of school life. We are convinced that if you take these two goals seriously, you will see positive, lasting, tangible results. If we limit ourselves to two goals, several things become possible. First, it is easy to keep track of two goals. Second, it is relatively easy to communicate such a limited number of goals to students, parents and other interested parties. And third, when it comes to measuring goal attainment, wouldn't you rather have two goals to measure than the typical dozen or so? What we are proposing is that we not get lost in the goal structure, which is more often than not exactly what happens.