Taking Forward the Jigsaw Classroom: the Development and Implementation of a Method of Collaborative Learning for First Year Philosophy Tutorials

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Abstract

This article discusses a project which was funded by a small grant from the Subject Centre for Philosophical and Religious Studies from July 2010-June 2011. It begins by explaining the reasons for looking for a new teaching and learning design before outlining the technique used (the Jigsaw Classroom) in detail. It then shows how this technique was used in first year philosophy tutorials and discusses the results, including feedback from the tutor and students. It concludes with some general remarks about the success of this method and its transferability to other subject areas.

Background

I have been a Graduate Teaching Assistant (GTA) at the University of Glasgow for over 10 years now. I tutor in philosophy, and mainly take first year tutorial classes. First year philosophy at the University of Glasgow is a fairly large class of about 450 students with a wide range of abilities, expectations and motivations. This is because of the structure of many undergraduate degrees at the University of Glasgow, where students study for three subjects in the first and second years of their degree before going on to choose one or two subjects for honours level study (most Scottish degrees last for four years, with the first two years being pre-honours levels). This means that as well as those who are intending taking philosophy to honours, first year classes contain students who are merely taking philosophy as a 'filler' subject. So as well as the usual problems about getting students to participate in class discussions, I needed to find a method of running tutorials which would engage all students, without teaching down to the lowest level of ability or interest. What I wanted was a learning design which would allow all of the students to participate, while making allowance for the fact that some would want to engage more with philosophy that others: a method that would reward those students who did put in a lot of study time without penalising those who would

not spend much time preparing for my class. I also wanted a method of breaking the classroom down into small groups so that everybody would have a chance to participate. I had been using worksheets and group work with my classes for a couple of years, but was looking for a method of running groups that avoided the repetition that often happens at feedback time (which was tedious for the students), which resulted from each group being given the same questions to discuss and feed back on. A tall order indeed! But when I heard about the Jigsaw technique I realised that this had the elements of a method that would work with my classes.

Description of the 'jigsaw classroom'

The jigsaw classroom is a co-operative learning technique which was first used in Texas in the early 1970s by a social psychologist called Elliot Aronson in order to diffuse the 'explosive situation' of desegregation. Having observed lessons in state schools for a few days, Aronson concluded that: 'inter-group hostility was being fuelled by the competitive environment of the classroom'. In order to diffuse this hostility, Aronson and his students devised a learning design called the Jigsaw Classroom.[1] In Aronson's original design, the class was subdivided into groups of 5-6 pupils in order to learn about a class topic. Each pupil was assigned a part of the topic to learn about and teach the rest of the group about. In order to do this, they were structured into interim 'expert groups' who convened in order to focus on learning each sub-topic. After a pre-arranged period of time all pupils returned to their original groups and put together the topic into a coherent whole.[2] At the end of each block of teaching there would be a class test, which each student would sit individually. In order to do well in this test, it was vital that they listened to other students, as they needed to learn from others in order to get a good mark. This meant that the stronger students had to rely on the weaker students in order to pass the test, and this encouraged a co-operative model of learning. Here's a description from Aronson's website which explains how and why his Jigsaw Classroom works as a technique for collaborative learning:

> Just as in a jigsaw puzzle, each piece – each student's part – is essential for the completion and full understanding of the final product. If each student's part is essential, then each student is essential; and that is precisely what makes this strategy so effective. Here is how it works: The students in a history class, for example, are divided into small groups of five or six

[1] http://www.jigsaw.org/history.htm

[2] The design is called Jigsaw because of this: each group is comprised of students who have each studied part of the topic – together the group hold all the pieces of the jigsaw.

> students each. Suppose their task is to learn about World War II. In one jigsaw group, Sara is responsible for researching Hitler's rise to power in pre-war Germany. Another member of the group, Steven, is assigned to cover concentration camps; Pedro is assigned Britain's role in the war; Melody is to research the contribution of the Soviet Union; Tyrone will handle Japan's entry into the war; Clara will read about the development of the atom bomb.[3]

I heard about this technique from Steve Draper, who teaches psychology at the University of Glasgow.[4] He had been using a version of Jigsaw in order to deliver a senior honours psychology option, where students worked together in order to teach themselves about a specific subject which they were not given lectures on, then produced a group wiki page in order to teach the rest of the class about this topic.[5] I immediately saw that this was a technique I could also use. Aronson used this in order to break down racial barriers, Steve used it in order to encourage peer learning: my concern was a more general one about working with students with mixed motivations. As I noted earlier, this technique forces all students to depend on other students in their group. It can therefore engage all students, regardless of their interest or ability, by creating an environment where the more motivated students take control of their own learning initially, then teach others what they have learned.[6] The fundamental difference between this and other methods of group work I had used was that the dynamics were different, and this is hard to convey in a short piece like this – but I will say that it works. Aronson's original design can be found as an appendix to this article.

My Jigsaw wikis and tutorials

As I said, I'm a GTA in Philosophy at the University of Glasgow. This means that I am employed on a part time basis to take some tutorial groups for level 1 classes.[7] As such, I have no control over the content of the course, but have a fair amount of autonomy with regard to how we structure tutorials.[8] We use Moodle as our Virtual Learning Environment (VLE) at the University of Glasgow, and each philosophy course has its own Moodle course set up. The course which I was teaching on during my project, 'Knowledge and the World',

[3] http://www.jigsaw.org/overview.htm
[4] http://www.psy.gla.ac.uk/~steve/
[5] http://fims.moodle.gla.ac.uk/course/view.php?id=257 (log in as 'guest')
[6] As such, it is in line with neo-Vygotskian theorists who argue for a social constructivist theory of learning.
[7] At the time of the project I had 4 groups of about 15 students and 1 group of 5 students – a total of 64 students from a class of about 440.
[8] Tutors are given a handout with suggestions for about 15 tutorial topics, from which we pick the 8-10 we will use.

had a well set up course page where lecturers posted lecture notes and support materials, and the course convenor posted notices to the course forum. Each tutor also had their own forum for their tutees. How we used these was up to us, but we were strongly encouraged to at least post a timetable of tutorial topics and post each week with a reminder about the tutorial topic. I was also very lucky to have the full support for my project from the course convenor, who allowed me to set up group wikis to sit alongside my forums on the VLE.

I divided students in each of my groups into sub-topic groups A, B and C, and divided each of my chosen tutorial topics into three sub-topics. I then set up a wiki for each sub-topic. Each week, I posted the overall topic to the forum, with links to the sub-topic wikis. On the sub-topic wikis I posted each sub-topic and questions for consideration. Students were encouraged to read and write to these wikis prior to each tutorial.[9] I hoped that at least some students would use the wikis in order to talk to others outside tutorials, though I did realise this was an optimistic demand.

Each week, at the tutorial, students convened into their sub-topic groups and worked together for about 20 minutes to agree answers to their sub-topic. We then re-convened as a whole class and each group took turns to present their sub-topic to the whole group. I provided handouts based on all of the sub-topics so that each student could build a personal portfolio for revision purposes. During the tutorial each student annotated these handouts with their personal notes. These proved to be a valuable resource when it came to revision time.[10] In fact, this was an outcome that I had not anticipated – when it came to the final tutorial, traditionally a revision tutorial, students told me they had no need for this as they already had their own portfolio of revision notes prepared (that is, the handouts they had annotated during the weekly tutorials).

I enjoyed this method of structuring and delivering tutorials. I found that my tutees were keen and enthusiastic – class discussions were lively with all students participating in the group tasks and whole-class discussions. This was a small project, and I am not claiming to be able to make a definitive analysis of the results, but the student feedback as well as the final results suggest that students taught by this method did perform better than the rest of the cohort. I continue to use the Jigsaw Classroom in my tutorials, and other tutors have also used my method and worksheets successfully.

[9] See Appendix B for an example of an overall topic and the three subtopics.
[10] More details of my project design can be found in my presentation slides http://glasgow.academia.edu/SarahHoneychurch

Student performance

I asked a Teaching Fellow from the University of Aberdeen to act as external assessor for this project. As well as having access to the VLE he analysed all of the results for the class and produced a detailed report. In particular he highlighted the following:

- Students taught using the jigsaw technique consistently outperformed 'all other students' by more than a 5% margin and had a 93.6% pass rate compared to 84% for the latter. (Rounding to the nearest 0.1%.)
- Performance was closest at the top of the rage with 8.1% students securing A marks compared to 7.4% for 'all other students'.
- Overall, the big successes were (i) the reduction of fails; and (ii) the significant increase in marks in the B range, 45.2% compared to 36.6% for 'all other students'.
- Students taught using the jigsaw method again secured marks that were not just higher but significantly higher, with 35% B marks compared to 25.6% for 'all other students' and an overall figure of 38.3% for marks in the A+B range compared to 30.5% for 'all other students'.[11]

Overall the external assessor judged this project to be a success, with one qualification (see below).

Student feedback

At the end of the course, one student wrote me a detailed report of her experiences of the tutorial. Here is an extract from that report:

> Overall, therefore, the Philosophy 1K tutorials compared favourably to other tutorials, covering a lot of ground in the very limited time span that is available for tutorials. Due to the fact that everyone was encouraged to contribute at some point, the discussion usually involved more people than in other tutorials that didn't use this format, especially since it wasn't only one group presenting something per tutorial. However, the presenting was comfortably informal because no one was being pressured to say something at any cost. Receiving feedback on our ideas about philosophy from the tutor and from peers was always helpful and

[11] Report sent to Subject Centre for Philosophical and Religious Studies at the end of the project.

> constructive, and the opportunity to discuss something in more depth online also always existed.[12]

In addition, students were asked to fill out a feedback questionnaire including a section for comments, which most completed. In general, students reported that tutorials had helped to remove their insecurities; that the atmosphere was 'comfortably informal'; and that feedback from peers and tutor was 'always helpful and constructive'. Here are some typical comments in reply to the question 'What was the best thing about tutorials?':

> The input from the group. A majority had things to say that were insightful and useful; unique amongst my tutorials for other classes.

> That everything was made clear that had been hard to understand in lectures. We were able to discuss interesting ideas and learn from each other. The sessions were well structured.

> Notes from wiki tasks. When printed out and filled in, the topics were well broken down into manageable chunks. This made the entire course easier to understand fully. The notes left are excellent for revision.

A further indication to me that this project had been successful in terms of student satisfaction happened the following semester when students requested that I continue using the Jigsaw Classroom although the project was over.

Reflections for the future

I had hoped that students would engage with the wikis and use it as a space for collaborative writings. Although some students did do this, the majority did not use it interactively, but tended to treat it as a useful e-forum for the delivery of preparatory tutorial materials. The external assessor picked up on this point, commenting that:

> To some extent this is to be expected. On an optimistic view, the outcome *might* have been different with honours students rather than first years but as students have to opt-in to wiki editing they may feel that it risks exposing gaps in their knowledge and doing so in a very public way. Even so, the wikis did remain available and, by virtue of being clustered together, were no doubt a more useful revision tool than a succession of e-mailed notes would have been. … the wikis were still a useful tool even if they were not used, strictly, as wikis.

[12] See Appendix C for the full report.

I think that this is a fair comment. I continue to use wikis in order to deliver my tutorial materials, and I emphasise during my teaching the potential these will have at revision time. While I still remain optimistic about the possibility of using wikis as I had originally intended, I think that this may need more support than an hourly paid GTA is able to provide. Nowadays my primary interest is in helping others to develop the general technique for use in other subject areas. I also continue to research in the area of collaborative learning and to seek out other learning designs that can be adapted.

Conclusion

Since beginning this project I have changed my career, and am now employed as a Learning Technology Specialist at the University of Glasgow. Getting the grant from the Subject Centre for Philosophical and Religious Studies gave me the confidence to apply for this post. I continue to use the Jigsaw Classroom in order to deliver my tutorials, and have advised other at the University of Glasgow who wish to use this method. At the present time I am Principal Investigator on an internally funded project which uses the Jigsaw Classroom and am working with Physics and Archaeology in order to show that this method will transfer to other subject areas. I believe that this technique is, in principle, transferable to all subject areas, and will benefit all students, regardless of their level or ability.

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Appendix A: Aronson's original design

According to Aronson (2008) there are ten steps that are considered important with regard to the implementation of the jigsaw classroom technique:

1. Students are divided into a 5 or 6 person jigsaw group. The group should be diverse in terms of ethnicity, gender, ability, and race.

2. One student should be appointed as the group leader. This person should initially be the most mature student in the group.

3. The day's lesson is divided into 5–6 segments (one for each member)

4. Each student is assigned one segment to learn. Each student should only have direct access to their own segment.

5. Students should be given time to read over their segment at least twice to become familiar with it. Students do not need to memorize it.

6. Temporary experts groups should be formed in which one student from each jigsaw group joins other students assigned to the same segment. Students in this expert group should be given time to discuss the main points of their segment and rehearse the presentation they are going to make to their jigsaw group.

7. Students come back to their jigsaw group.

8. Students present their segment to the group. Other members are encouraged to ask question for clarification.

9. The teacher needs to float from group to group in order to observe the process. Intervene if any group is having trouble such as a member being dominating or disruptive. There will come a point that the group leader should handle this task. Teachers can whisper to the group leader as to how to intervene until the group leader can effectively do it themselves.

10. A quiz on the material should be given at the end so students realize that the sessions are not just for fun and games, but that they really count.[13]

Appendix B: teaching materials – tutorial topic: Descartes' methodological doubt

Subtopic A: Deceitful deliverances of the senses

Primary Reading: *Meditations 1*

[13] http://en.wikipedia.org/wiki/Jigsaw_(teaching_technique)

All that I have, up to this moment, accepted as possessed of the highest truth and certainty, I received either from or through the senses. I observed, however, that these sometimes misled us; and it is the part of prudence not to place absolute confidence in that by which we have even once been deceived.

- What is the argument?
- What is the scope of the argument? (What is it meant to cast doubt on? What is it not meant to cast doubt on?)
- Analysis of the argument. Does this argument succeed?

Subtopic B: The dream argument

Primary Reading: *Meditations 1*

Let us suppose, then, that we are dreaming, and that all these particulars – namely, the opening of the eyes, the motion of the head, the forth- putting of the hands – are merely illusions; and even that we really possess neither an entire body nor hands such as we see. Nevertheless it must be admitted at least that the objects which appear to us in sleep are, as it were, painted representations which could not have been formed unless in the likeness of realities; and, therefore, that those general objects, at all events, namely, eyes, a head, hands, and an entire body, are not simply imaginary, but really existent. For, in truth, painters themselves, even when they study to represent sirens and satyrs by forms the most fantastic and extraordinary, cannot bestow upon them natures absolutely new, but can only make a certain medley of the members of different animals; or if they chance to imagine something so novel that nothing at all similar has ever been seen before, and such as is, therefore, purely fictitious and absolutely false, it is at least certain that the colors of which this is composed are real. And on the same principle, although these general objects, viz. [a body], eyes, a head, hands, and the like, be imaginary, we are nevertheless absolutely necessitated to admit the reality at least of some other objects still more simple and universal than these, of which, just as of certain real colors, all those images of things, whether true and real, or false and fantastic, that are found in our consciousness (*cogitatio*),are formed.
To this class of objects seem to belong corporeal nature in general and its extension; the figure of extended things, their quantity or magnitude, and their number, as also the place in, and the time during, which they exist, and other things of the same sort.
We will not, therefore, perhaps reason illegitimately if we conclude from this that Physics, Astronomy, Medicine, and all the other sciences that have for their end the consideration of composite objects, are indeed of a doubtful character; but that Arithmetic, Geometry, and the other sciences of the same class, which regard merely the simplest and most general objects, and scarcely inquire whether or not these are really existent, contain somewhat that is certain and indubitable: for whether I am awake or dreaming, it remains true that two and three make five, and that a square has but four sides; nor does it seem possible that truths so apparent can ever fall under a suspicion of falsity [or incertitude]

- What is the argument?
- What is the scope of the argument? (What is it meant to cast doubt on? What is it not meant to cast doubt on?)

- Analysis of the argument. Does this argument succeed?

Subtopic C: The demon supposition

Primary Reading: *Meditations 1*

> I will suppose, then, not that Deity, who is sovereignly good and the fountain of truth, but that some malignant demon, who is at once exceedingly potent and deceitful, has employed all his artifice to deceive me; I will suppose that the sky, the air, the earth, colors, figures, sounds, and all external things, are nothing better than the illusions of dreams, by means of which this being has laid snares for my credulity; I will consider myself as without hands, eyes, flesh, blood, or any of the senses, and as falsely believing that I am possessed of these; I will continue resolutely fixed in this belief, and if indeed by this means it be not in my power to arrive at the knowledge of truth, I shall at least do what is in my power, viz, [suspend my judgment], and guard with settled purpose against giving my assent to what is false, and being imposed upon by this deceiver, whatever be his power and artifice.

- What is the argument?
- What is the scope of the argument? (What is it meant to cast doubt on? What is it not meant to cast doubt on?)
- Analysis of the argument. Does this argument succeed?

Appendix C: Student feedback report

Sarah Honeychurch's Philosophy 1K (2010) tutorials

The Philosophy 1K tutorials were a helpful and relevant addition to the 1K lectures. Both the structure and content of the tutorials were beneficial to all.

Because of the wiki system of group work used in the tutorials, ideas were exchanged and knowledge shared to a greater extent than in other tutorials. A good balance was achieved in uniting the benefits of group work – the exchange of different ideas, angles, and viewpoints on various topics – with the avoidance of what is often perceived as the negative side of a presentation format: the formality of presenting our own ideas and opinions, and the way we thought to have understood the content of the lectures, to an audience. Especially since Philosophy is usually regarded as a rather difficult subject, having the opportunity to consolidate what we had learned in the lectures as well as discuss our takes on the material was invaluable. And since much of our understanding still stood on shaky ground after only having attended lectures, being able to clarify concepts in a group context

without the pressure of formal presentations but with all the advantages of having undertaken group work was very helpful indeed, as it removed insecurities that otherwise could have stood in the way of understanding the course content. Furthermore, the presentation of one group's answers would always immediately lead to a broader discussion involving most or all members of the tutorial group, so that a very active atmosphere ensued, which was also advantageous to the learning environment.

To address the more practical aspects, the online support for this tutorial format, meaning the wikis and forum, were also very satisfactory. The forum was easy to use intuitively and served well as a means of announcing the tutorial topics to everyone every week. The wikis took a bit of getting used to, but despite this and some minor technical difficulties, they ended up being very valuable for those who took advantage of them. Enough assistance was provided for us to understand how a wiki works. If we wanted to clarify ideas or answers to the tutorial topic questions or if we weren't sure how to go about answering them, we could post on the wiki and communicate with everyone else across the tutorial groups who had the same questions. Moreover, after the tutorials we could go back to the wiki and amend or elaborate on previous points with the new knowledge that was gained during the tutorial. And the fact that before the exam, all group wikis were made available to everyone was very helpful in revising and preparing for exams. Finally, relevant extracts from the class texts were provided to each group along with their tutorial questions at the beginning of every tutorial, which served to refresh our memories and also to help out those who didn't have the texts with them.

Overall, therefore, the Philosophy 1K tutorials compared favorably to other tutorials, covering a lot of ground in the very limited time span that is available for tutorials. Due to the fact that everyone was encouraged to contribute at some point, the discussion usually involved more people than in other tutorials that didn't use this format, especially since it wasn't only one group presenting something per tutorial. However, the presenting was comfortably informal because no one was being pressured to say something at any cost. Receiving feedback on our ideas about philosophy from the tutor and from peers was always helpful and constructive, and the opportunity to discuss something in more depth online also always existed. I also appreciated that the tutorials were used as a consolidation of what had been covered in the lectures already, since introducing too much new or extra material probably would have confused students – especially those taking Philosophy for the first time – and perhaps diluted the course content. The only improvement that I could conceive of perhaps does not really lie in the hands of the tutor: using the wikis and forum to their full

potential, meaning more participation by students in the online discourse, would have been even more helpful. Maybe this would be possible if the wiki structure were to be adopted for a longer period of time, giving students the opportunity to get used to the system and to be more involved.