THE ROLE OF THE TEACHER IN GROUPWORK

Chris Stephens and Rosalyn Hyde describe their work in progress to develop an appropriate skill set with a Year 9 class.

We have been thinking about group work in Chris’s mathematics classroom for a few months now. One of the things Chris has done is to audio record students working in groups in his top set Year 9 class. Groups of students were recorded whilst working on a range of tasks including ‘Numerically equal’ (NRICH). The opportunity to ‘listen in’ to individual groups working using the recordings enabled us to reflect on Chris’ role as the class teacher, and the impact of his actions on student learning. Here we present some of our thoughts that have occurred as we have discussed various aspects of groupwork.

What makes a good task for groupwork and discussion, particularly for able students?

We think that good tasks need to offer students a range of methods of approach, need to provide challenge and sufficient opportunity for extended time to be spent on them. Extensions to the problem ‘Numerically equal’, for example, can be explored algebraically, graphically, or by trial and improvement methods. Tasks where there is a meta-problem to solve, perhaps where rules for individual cases can be drawn together to produce an overall rule as with tasks that lead to Pick’s Theorem, or where geometrical reasoning provides justification for the algebra for example ‘Painted Cube’ or ‘Patio Slabs’, provide opportunities for students to experience both the elegance and descriptive power of mathematics.

In particular, our experience suggests that able students particularly enjoy tasks that provide ‘self-scaffolding’ through an intuitive beginning that leads to opportunities for generalisation. Students also seem to enjoy problems that appear initially ‘unsolvable’, because this provides the necessary challenge, but where mathematics provides an elegant solution - that students might describe as a ‘trick’. In Chris’s classroom discussion between students leading to learning came about when learners were unable to see a clear solution, and had to try different methods until they had their ‘Eureka’ moment.

Being prepared for groupwork in the classroom

We think that teacher preparation when using open tasks for groupwork needs to go further than just the selection of suitable tasks. Chris says that he thinks it is important that he tries the tasks he sets to a class first in order to find a solution, or multiple solutions, as this allows him to be able to scaffold student learning through teacher-pupil discourse. Chris believes that by doing a task himself, he is able to see the task through the eye of his learners and to ask: What aspects of the task would students have questions about? Where might they go wrong? How can I allow for them to learn in an exploratory way? Ros takes a more holistic view on this matter and thinks that if she solves tasks in too much detail, prior to setting the task to a class, it sometimes restricts her ability to respond to alternative lines of enquiry generated by students. Perhaps, with experience comes the confidence to recognise and analyse a good task, to select a task that is within the capability of a class without necessarily fully completing the task yourself.

Knowing the possibilities presented by a task allows the teacher to prepare suitable scaffolding for learners. This scaffolding might take the form of help cards, of a writing frame, of practical materials, of alternative versions of the same task, or some other means. Students could then select and access appropriate scaffolding independently before resorting to seek teacher support.

The other important element in preparation for groupwork involves the teacher thinking about how students might be grouped. Our experience suggests that it is important to consider whether you want students to work in friendship groups, to work in self-selected groups, to work in randomly-assigned groups, or to work in teacher-engineered groups which might be of mixed attainment so that the higher-attaining learners are able to assist the lower-attaining students to understand the task. Chris believes that the decision on how to group students depends both on the class, and on the task. In general he prefers to use friendship/ self-selecting groups because students are able to get on together, and trust each other when trying to solve a problem. However, sometimes such groupings work less well as students can become easily distracted if the task is complex, in which case Chris prefers to arrange the group himself. Experience shows which students are able to work well together, which means that Chris can ensure that there is a very able learner in each group to act as a lead learner to other members of their group. Chris says that some of his classes make more productive use of opportunities to...
work together than others. He tends to give students in these classes more opportunity to self-select their groups. Whereas Chris will proactively arrange the groups for other classes, as he believes that this can helps learners to be more focused on the task at hand, and their own work.

**Presenting a task to the class**

The skill, of course, in introducing a task to your class is to present the problem so that students are able to *start*, without the need to *tell* them what to do, and *how* to do it. Chris has found that giving a concrete example, perhaps through images, text and numbers, can help when presenting a task to students. This also allows learners to engage with the task quickly and meaningfully. The expectation is that students are then able move on to exploring and generalising.

**The role of the teacher during groupwork**

Having students in your classroom work on extended tasks in groups requires a different approach from other ways of working in the classroom such as whole-class teaching. One of the things Chris became most aware of was the need to really listen to what students say, before offering help. On one occasion, Chris offered support through a series of generic ‘help cards’ offering problem solving strategies to a group of boys, only for them to discard his help saying:

*Ian*: I thought when he said these will help he’d give us like a formula or something.

*Neil*: Why do you think that?

*Ian*: We’re not asking any of those questions anyway.

*John*: No, they’re not very helpful are they? Are we all in agreement with that?

*Careful listening* allows the teacher to identify the nature of the students’ problem and it provides a rationale to offer appropriate and suitable support. In the example above, it transpired that students working on ‘*Numerically equal*’ were unable to manipulate the algebraic equation they had generated because they had failed to realise how the equation could be factorised. Our experience shows us that *careful listening* to a group working together can allow the teacher to identify the specific support a group, or an individual, needs to progress within a task and how that support might be provided.

**Good ways to arrange group feedback to the whole class**

Chris also noticed that when he asked groups of students to give feedback about what they had done to the whole class, things became very repetitive. Listening to his audio tapes also showed us that learners were having in-depth conversations with each other and therefore there was only limited value in asking them to repeat this to the whole class. We believe that there are ways around this, and this is one aspect of his practice that Chris is keen to develop and change. For example, groups can be asked only to contribute things that are different to those offered by other groups, groups can be asked to feedback on different aspects of their work, or asked for feedback from a few, pre-selected groups. Groups might also share their feedback by producing a poster which can be displayed in the classroom, as opposed to giving oral feedback. Chris also suggests that groups of students might share their findings with other groups which might be less daunting than the whole class. Whilst he says this might feel a little strange, because as the teacher you would not hear all the student presentations, Chris says that his research suggests that able students can, and do, share their reasoning with each other and that it is important to give students the opportunity to communicate with each other in this way.

**What are the benefits of doing groupwork with classes of able students?**

The following two excerpts illustrate student thinking and reasoning with the *Equable Shapes* task:

*Ian*: Yeah, but we got, we got that, but, we got to work out more. Or is that the only answer there is?

*John*: That’s every single answer there is.

*Ian*: Is the only answer this?

*John*: If you pick any number for b, any number you like, literally any number, “a” will be equal, a number that will make it up.

*Neil*: Wow. Does that mean we’re done?

In this second excerpt, the students have moved on to looking for a circle where the circumference is numerically equal to the area:

*John*: So r equals two.

*Ian*: r equals two.

*Neil*: It could be zero, cos, zero, zero, zero, zero

*John*: No, it has to be a, no it could be zero actually. I don’t know how I didn’t get that… I wonder why that is? No ok, I see where that is, because with here, its r squared, and we should have factorised it, then we would have got, the little things where this bit is zero. So you could put that....

*Ian*: Or, or zero.

Our discussions about Chris’s work in his classroom support our conclusion that groupwork is a valuable undertaking in the mathematics
classroom. We think students develop their mathematical understanding though listening to peers, and through explaining something to someone else. When students talk in groups this talk is about more than just solving the task. The talk is also about how to present their mathematics, and the talk allows learners to develop their verbal skills in reasoning and justification, which can be easier than developing similar written skills. Students are able to explore their own thinking and that of other learners. It allows them to draw on the mathematical repertoire of the whole group, rather than simply their own, and helps to develop the necessary problem-solving skills. The most able students are able to support those who are less able than themselves, and are also encouraged to discuss their solutions with others.

We also believe that students find working in these ways engaging and that this, in turn, is likely to lead to further learning. The evidence from Chris’s classroom also suggests that, provided suitable scaffolding is provided at the appropriate moment for an individual, the groupwork experience can be both rich and rewarding for all those involved.

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Reference
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