Can engaging teaching survive the knowledge revolution?

Christine Holbrey and Lydia Parkhurst

This article shares a trainee teacher's attempts to engage and motivate a large, mixed-ability GCSE geography group by using active learning strategies.

> *Teaching a good geography lesson has to be the aim of a good teacher, but what exactly does a good geography lesson look like? How can teachers make their lessons good? And who decides what is 'good'?* (Bustin, 2017, p. 134)

Many within the education community have welcomed the recent 'knowledge' revolution, with a knowledge-based national curriculum and content-heavy revision to both GCSE and post-16 geography specifications. Roberts (2010), reflecting on her experiences of examining newly qualified teachers, raised concerns about teachers' work being overly defined by pedagogy, rather than subject knowledge, putting at risk the disciplinary integrity and rigour of school geography. Mitchell and Lambert (2015) urged us not to lose sight of the geographical knowledge, the 'what to teach'; otherwise there is a danger of the 'pedagogical adventure', with a focus on generic skill development or engagement, becoming the end goal. They emphasised the need for pedagogy, the 'how to teach', to be about 'accessing and developing worthwhile and meaningful knowledge to take the pupil beyond the knowledge gained in everyday life' (p. 375).

Unfortunately, the 'knowledge turn' has provided the impetus for some teachers to return to a didactic approach. Lambert (2017, p. 20) is heavily critical of this style of teaching, referring to the 'futility of rote learning' and reminding us that there are powerful, adventurous and active pedagogies which encourage geographical thinking, and at the same time value geographical knowledge and evoke intellectual effort. Recent research from the Education Endowment Foundation (EEF) (2019, p. 2) recommends metacognition: 'evidence suggests the use of metacognition strategies – which get pupils to think about their own learning – can be worth the equivalent of an additional +7 months' of progress when well used'.

To teach a good geography lesson we must understand the relationship between the learning activities and the knowledge being learnt, so students make sense of the geographical content and are able to transfer it to other contexts. This article shares trainee teacher Lydia's efforts to engage and motivate a large, fairly lively mixed ability group following the AQA GCSE specification. The learning objectives for the lesson were:

- to understand the key features of a basic flood hydrograph
- to analyse a flood hydrograph.

To achieve these Lydia adopted two thinking skills strategies– mapping from memory and living graphs – derived from David Leat's inspirational *Thinking Through Geography* (Leat, 1998).

Mapping from memory

Mapping from memory develops students' cognitive abilities by improving their visual literacy. Students worked in small, pre-determined, mixed ability groups and were given a range of resources including string, masking tape, poster paper, and sticky notes. One student at a time from each group spent 30 seconds outside the classroom studying the components of a flood hydrograph attached to the wall; then they had to relay this information verbally to the rest of their group who had two minutes to re-create the hydrograph, using the resources provided.

Each member of the group took a turn outside the classroom, which was 'policed' by the substantive class teacher to ensure no cheating took place and no mobile phones were used! Spirits in the class were high, but productive; students clearly enjoyed the novelty of the experience and, interestingly, began to differentiate for themselves and fellow students, aligning individuals in the group with different levels of information. Some groups split the hydrograph into sections for this purpose; others allocated specific types of information to individuals. At the beginning of the task Lydia presented a WAGOLL (What a good one looks like) to focus students' mental activity and help them process information accurately in terms of shape, scale and labels. As their strategies for information capture became more successful, the time students spent outside the classroom reduced.

Not all groups flourished; one group of four boys struggled with their self-confidence and were less coherent as a team. Rather than focus on their own efforts, they disengaged from the task and opted instead to copy from a neighbouring team. While this could be viewed as a successful strategy, perhaps more could have been done to emphasise the low-stakes competitive nature of the activity. Generally, students were noticeably encouraging of each other; they listened carefully and asked clarifying questions such as 'What is rainfall measured in?', 'Does the time lag start at the highest rainfall bar?' and 'How many hours from the start of the rainstorm was the peak flow?' Their exploratory talk clearly had a positive impact on their ability to create detailed and accurate reproductions of the hydrograph (Figure 1).

During the activity Lydia assumed a monitoring role, listening carefully to conversations and observing how the groups were getting on. She only interrupted to refocus attention where necessary and to manage the 30-second time slots outside the classroom. At the end of the exercise she marked the completed hydrographs, awarding points for correct replication of the key features.

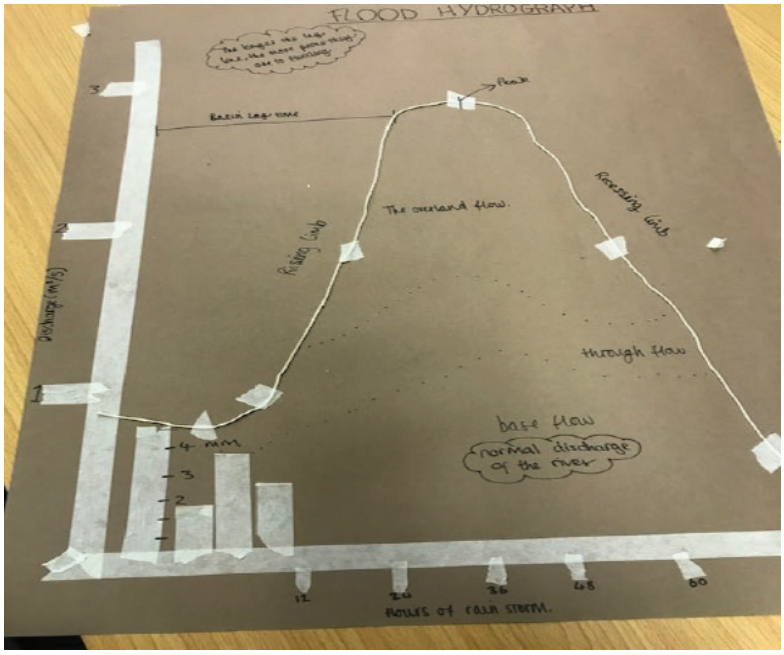

Figure 1: Example of a student's hydrograph. **Photo:** © Christine Holbrey.

Lydia used this debrief to reintroduce the first learning objective, 'to understand the key features of a basic flood hydrograph', and to reinforce students' understanding of the key components and their definitions.

While discussing the definitions of 'peak rainfall' and 'peak discharge' she asked:

- How long did the storm last?
- How much rain fell?
- What was the highest amount of rainfall and how is it measured?
- How many hours into the rainstorm was peak discharge?
- What was peak discharge?

Students gave accurate responses to the data-style questions, demonstrating an understanding of the terms and their ability to interpret a hydrograph. The question 'Why is there only a little increase in discharge when the rainfall first starts?' led to further discussions about rain falling directly into the river channel, vegetation intercepting rainwater and water infiltrating the soil. 'Interception' and 'infiltration' were embedded as key geographical terminology in place of 'plants stopping water and 'rainfall sinking through the soil'.

Students appeared to understand that the 'rising limb' showed increasing flood water in the river, resulting in increased discharge, and when asked about soil saturation (not their terminology) were able to articulate that overland flow would increase. They were also able to infer that snowfall rather than rainfall might affect the dynamics, snow melt being a slower process of water entry into the river channel, and that frozen ground would increase the amount of overland flow. They were less confident about how 'throughflow' and 'overland flow' would alter the shape of the rising limb, and would have benefited from an opportunity to compare different shaped graphs and apply their newfound reasoning.

The relationship between discharge, throughflow and overland flow were again reinforced during discussions on the 'falling limb', which also introduced the idea of 'baseflow' as the normal river discharge through groundwater seepage. Lydia provided a definition of 'lag time' and asked: 'Do you think rivers with shorter lag times will be prone to more or less flooding?' There was some debate about this; a number of students thought that the shorter the lag time, the more susceptible rivers are to flooding. Introducing the idea of flash flooding would have been useful here. Students did not appear to have a firm understanding of the complexity and interrelatedness of the factors at play in a drainage basin. For example, a large drainage basin usually results in a slower water transfer, as the water has much further to travel to reach the main channel; however a larger basin will receive more precipitation, so over time may result in a much higher river discharge, presenting a more serious flood risk.

While it might appear that the second lesson objective, 'to analyse a flood hydrograph' had been met, it could be argued that the wording of the objective put the emphasis on data response, rather than on deep thinking and geographical knowledge. A slight rephrasing – 'to analyse the factors affecting the shape of the flood hydrograph' – would perhaps have achieved a move away from the skills-based focus towards subject knowledge development, aligning with the GCSE AQA specification and paving the way for exploration of the impact of geology (rock type), relief (steepness of slopes), land use (urbanisation, deforestation and agriculture), drainage basin size and density.

Living graphs

To build on the feedback from the previous activity and secure students' subject knowledge Lydia moved on to a living graph exercise. This is an ingenious way of moving graphicacy beyond the traditional drawing and describing elements; giving graphs a real-life context helps normalise them, provides relevance and enables students to apply knowledge in a more exciting and challenging way.

Students were given a range of everyday statements relating to a UK flooding event, for example: 'Mrs Jones runs outside to take her washing in' and 'On her way to work Mrs Jones notices plastic bags, weeds and other rubbish in the low branches of the trees by the river'. Students had to decide where on the hydrograph each statement would best fit. Lydia reminded them that there was not always a definitive answer and that understanding would arise from their interpretation and reasoning for their choices. The statements were differentiated to enable access and stretch; more challenging statements, with numerous correct locations, required much greater interpretation.

Work continued in small mixed ability groups and students tackled the task with enthusiasm, appearing to thrive on the mystery of the

challenge. More confident geographers supported weaker learners and little input or re-direction was required from the teacher (Lydia), who circulated the room, observing and listening to discussions. Teacher vigilance, and genuine interest in students' dialogue, is crucial: sometimes group work can lead to misconceptions being reinforced rather than rectified.

To conclude the exercise students shared their answers and considered the validity of their reasoning. Students now demonstrated a much greater understanding of the chronology of flooding and its impact on people, and they could make viable connections between the intensity of rainfall and an increased risk of flooding. Lydia used this as an opportunity to carefully interpose a number of questions relating to the shape of the flood hydrograph, and factors which might affect this, skilfully reintroducing the concepts of interception, infiltration, saturation, overland flow, throughflow and baseflow.

With a thorough, high-level debrief in the first activity, this reinforcement might not have been necessary. Nevertheless, Lydia took the opportunity to consolidate students' knowledge and extend their thinking about the complexities of the flood hydrograph. When asked about the impact of the common practice of paving over gardens for parking spaces students understood how urbanisation would encourage rapid water transfer and lead to flash flooding.

Lesson reflections and conclusions

During the lesson observation feedback with her school-based mentor Lydia reflected on her strengths in terms of organisation, engaging learning activities, WAGOLLs to support learning, positive relationships and pacy classroom management. She described how the chosen activities would promote collaborative and active learning, enabling students to build knowledge and understanding through social interaction. Her determination to adopt a more facilitative approach to learning, with an emphasis on problem solving, geographical thinking and reasoning, clearly showed that she had begun to think carefully about the nature of the tasks and their relationship to the learning objectives.

Asked about the geographical learning which took place during the lesson, Lydia referred to students' understanding of new geographical vocabulary, e.g. peak rainfall, peak discharge, lag time, etc., and their ability to locate these terms on a flood hydrograph. She suggested that the mapping from memory task had helped students to associate numerical data with rainfall and discharge. It also improved their cognitive understanding of the process of flooding, from the onset of the rainstorm to the river's return to normal levels of flow. Similarly, processing the information for the living graphs reduced the abstraction of the hydrograph. By constructing meaning from the graph, students were able to explore people's connection with place, reinforcing contextual understanding and geographical reasoning.

Collaborative talk also proved effective: by seeking clarification from their peers students were able to develop and consolidate their geographical thinking. Misconceptions and inaccuracies were challenged and rectified by intervention from Lydia, much of it during the planned debrief. These debrief sessions were heavily reliant on effective questioning to promote thinking skills, enabling students to build on their learning and develop a much greater conceptual understanding. This was most noticeable during class discussions about the impact of soil saturation, snow melt and urbanisation, during which students were able to express a much deeper understanding of the factors that cause flooding, the relationship between these factors and their impact on rainfall and discharge.

The mapping from memory and living graphs activities not only helped students' geographical learning but also improved their motivation and behaviour. The debrief sessions are crucial to challenge students' geographical thinking and should allow time for questioning about issues highlighted in student-to-student conversations. Pre-planned questions can also be useful to help consolidate geographical knowledge and support extending thinking.

There are numerous long established engaging ways, not least Leat (1998), of developing students' geographical knowledge and understanding. In the interest of great geography teaching and learning, I hope that Lydia continues to champion strategies endorsed by the Geographical Association and the Royal Geographical Society (with the Institute of British Geographers) on their respective websites, which promote critical thinking skills and the development of geographical subject knowledge. | **TG**

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