

# Case Study 1: Developing Engagement and Understanding

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With geography straddling the sciences and social sciences, it inherits a range of teaching practices that include lectures, seminars/tutorials and laboratory-based activities. Within physical geography (and allied Earth sciences) a "traditional" curriculum has involved the delivery of core knowledge through lectures with laboratory activities to introduce techniques that are typically used within the discipline. Whilst techniques can be presented and explained within a lecture, laboratory classes enable active-learning through skills based practice, an instruction technique common across the sciences.

Knowledge has long been equated with ability (Robinson and Aronica, 2010), with assessment methods designed to assess the level of that knowledge. Yet this doesn't take in to account understanding, creativity or skills in relation to the subject area. These are arguably more important (Robinson and Aronica, 2010) both in terms of the development of personal autonomy (White, 2011) and of financial value to an information-led economy.

As a teacher my goal is to enable students to become autonomous academics; learners that begin with curiosity, seek knowledge and develop understanding. Both independent and forward looking - not only desiring understanding what they do know, but seeking out what they don't. Traditional teaching structures scale with difficulty and have often valued knowledge within the assessment process. What is needed is an instructional process that presents a curricula of knowledge, enables reflection to develop understanding and provides opportunity for correction.

I have become increasingly aware of issues related to understanding over the last 3 years through my own class on Remote Sensing (gs2390), in combination with my work as a school governor. Lectures involve the one-way flow of information from lecturer to student - there was opportunity for interaction through questioning and dialogue, however this was often limited with students more intent on receiving a copy of the slides and making sure they had the "knowledge". Exams identified both the lack of a skeletal body of knowledge ("the forgetting curve") and understanding. Students were on the receiving end of a monologue and worked through practicals as a recipe seeking to arrive at the "answer" – in short, they were passive rather than active learners. Understanding was a byproduct that sometimes occurred. That is not to say lectures were poor - I understood the benefit of well designed slides and articulate delivery for good communication and was commended for this. However it was often self-motivated students that succeeded.

Exposure to Primary School teaching that involves active play and questioning to develop understanding, along with current debates on the efficacy of lectures as an androgogic method (e.g. Robinson and Aronica, 2010; Clark, 2011; Bligh, 2000),

forced me to reflect and reassess methods of delivering the curriculum. As noted in my Reflective Account of Practice, two key elements entirely changed my thinking:

(1) Attention Span: adults find it difficult to remain engaged for more than 12-15 minutes (Medina, 2009). As an academic I know I can't remain focused for longer, yet as a lecturer the intent is to "deliver" 1-2 hours of "content".

(2) Forgetting Curve: knowledge retention is difficult and drops away very quickly (Ebbinghaus, 1885).

The work of Mazur (1995) provided the impetus to implement and trial (from 2013) a similar methodology for instructing students that targets the issues noted above. This works on the basis of the "flipped lecture" (as exemplified by the Khan Academy<sup>1</sup>) - that is, the lecture is not about transferring knowledge from a text book, but becomes a vehicle for enhancing understanding and scaling this to a large class. The students prepare for the class based upon set readings - their time is spent accumulating knowledge with the lecture focused upon developing understanding. The gap between knowledge and understanding is "ignorance"; this gap can be filled by identifying that ignorance through asking questions, allowing the students to identify where that exists and providing answers. Scaling comes through peer instruction by allowing students to engage with one another through discussion of the solutions. A fifteen minute rotational cycle of questioning is designed to maintain engagement, whilst remote voting provides instant feedback.

There is a 5-stage workflow to this process:

- **Pre-reading:** within gs2390 I had previously written a set of distance learning materials and these form the core "body of knowledge"
- **Questions:** 15-minute rotational cycles are begun by asking a question based upon the readings. This is designed to tap in to knowledge, but probes understanding.
- **Remote Voting:** students are given 2-minutes to work on the question (learn by "doing"; Gibbs, 1988) and then anonymously vote on an answer through remote polling. All the students see the results live.
- **Peer Instruction:** the question is designed to be "testing" with a proportion of incorrect answers expected. Students then have 3-minutes to convince their neighbour that they are correct. Regardless as to whether they arrive at the correct solution, they actively engage in debate.
- **Remote Voting:** students get a second chance to vote and the live score is presented to the class.
- **Answer:** a short 5-minute "mini-lecture" outlining the solution is presented.

Within a 2-hour session I will normally cover 5 topics. Since delivering the curriculum in this academic year there has been consistently good attendance and informal comments from students noting both how much they had learnt and how hard they had worked; formal module feedback is not due until January 2014. The approach enables the identification of students not-engaging with the process for individual follow-up.

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<sup>1</sup> <http://www.khanacademy.org/>

Since implementing this method I have had a peer observation by a member of staff and spoken to both teaching team colleagues and the departmental teaching and learning coordinator about the process and experiences. This is currently in the process of dissemination to the department.

As an academic the approach has been a revelation - it enables me to focus upon core learning obstacles within the curriculum, whilst freeing up time that would otherwise be spent transferring knowledge. This allows a greater degree of personalisation to the learning process. A full end-of-module review will take in to account module marks and student feedback.

## References

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