

A lesson from Finland, and how this is emulated in the Biology classroom.

By Kelley Rogers

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Early in my teaching career I considered 'good practice' to be the passing down of necessary content from teacher to student. This would usually involve a traditional style of lesson in which students would spend much of the time writing notes presented on the whiteboard. However, throughout the years, my perspective has changed significantly. This method of delivery for Science subjects, and the rote learning that it encourages, does not always result in a full understanding of the content; nor does it enable the student to apply this information to unfamiliar situations. Upon reflection, guidance and research, my approach as an educator has evolved. It has led me to be of the opinion that a student- focussed classroom is more effective, a classroom in which students are motivated to think independently, allowing for greater ownership of their own learning and thus better preparing them for the outside world.

Finland: a global leader in education

Yearly, *The Economist Intelligence Unit* produces a report that ranks the educational performance of numerous countries around the world. It uses a variety of international assessment pieces and studies, including the *Programme for International Assessment (PISA)* and *Trends in International Mathematics and Science Study (TIMSS)*, to score the Cognitive Skills and Educational Attainment of each country, therefore allowing an Overall Index Rank and Score for each country to be calculated.

In 2012, Finland was ranked number 1 in both the Cognitive Skills comparison and Overall Index (Pearson 2013). In PISA, Finland has been performing well in all subjects assessed during the latter part of the last decade (Sahlberg 2011). Given PISA particularly assesses how effectively students can apply learned material to unfamiliar situations, and considering the importance of this tool in the world beyond secondary education, the country's success suggests there is great benefit in the way Finland approaches the education of its young people.

Interestingly, Finland's performance in Science is outstanding compared with its nearest competitors. Their Science curriculum values experiential learning through experiments and problem solving over a content-heavy, vocally delivered program (Sahlberg 2011).

A different approach: the active learner

Finland's Science curriculum moves away from the notion that learning is the practice of storing numerous facts in one's memory. It values a learning environment where students' skills develop and refine, including their ability to research, question, critique, modify and analyse. All these are necessary to succeed at university and beyond.

Designing lessons so that the student becomes an active learner facilitates the development of these skills. Finland's Science curriculum focusses on students learning through experimentation. In active learning, instead of a scientific

relationship being explained by the teacher and then an experiment undertaken by students to model this, the reverse is achieved. An experiment is given to students, and they are responsible for analysing results and determining if a relationship exists. Research is then conducted to confirm their decision. This method requires more than rote learning; it requires observation, data collection and analysis, and research. It encourages students to discuss results and aid each other in identifying relevant information.

Additionally, this educational practice recognises that students are not blank canvases; they come with their own knowledge and experiences (Christensen 2001, p. 66). What they learn in the classroom is added to their current understanding of the topic. Every student has different experiences. Therefore although students may learn the same material, each student will understand and remember this in a different fashion. This results in a deeper understanding and remembering for a longer period of time.

Senior Biology at Somerville House

All Biology programs in Queensland secondary schools are guided and bound by the Biology Senior Syllabus. The syllabus states that 'through Science education students are encouraged to develop critical and creative thinking skills as well as scientific understandings' (Queensland Studies Authority 2006, p.1). If teachers only imparted knowledge, this aim would not be achieved. Students would not develop their ability to think independently, critically or creatively. The syllabus has been designed so that students receive multiple opportunities to be an active learner; an approach that has been highly successful for Finland. An example of such an opportunity is the Extended Experimental Investigation (EEI).

Biology students perform one EEI in Year 11, and another in Year 12, for assessment purposes. An EEI requires students to identify a variable they wish to manipulate in relation to a given topic, design an experiment, perform this over a number

of weeks, analyse the results, and identify weaknesses in initial research and mistakes in methodology. Through this process, the teacher acts as a guide so that the experiment will provide results that are relevant and able to be evaluated with some degree of success.

This does not mean the process is easy for the students. In fact, it is quite the opposite. During the first two weeks of an EEI, students often say 'I don't understand' and 'I don't know what to do'. This is not necessarily the case. Such statements stem from the fact that they are used to having concepts explained, or teachers telling them what to do. A condition of an EEI dictated by the Queensland Studies Authority is that a teacher is not allowed to tell students what will happen in their experiment. Teachers can guide them in the right direction and scaffold the experiment so it makes more sense; however, a majority of the learning should be controlled by the student. This approach results in a deeper understanding of the subject matter, a wider awareness of scientific methodology and an ability to recall the information for a longer period of time.

However it is not just an EEI where active learning is employed; it is also used to teach material examined under test conditions. Examples of this include rates of reaction for enzymes and mould growth, where experiments can be performed and variables manipulated to investigate the impact. Another is the exploration of a pluck or heart to determine how various systems work together, and how they are compromised if an organ or section does not function effectively.

Personal reflection

In conclusion, Biology is a challenging subject. Often students choose it because it is seen as the easier science when compared with Chemistry and Physics. Perhaps this thinking exists because Biology is the study of life and we are exposed to this from an early age. It could possibly be because human beings are rather self-interested animals. Regardless of the reason for this misconception, it is certainly wrong. Biology motivates students to question information presented as fact, assess the reliability of sources, form their own opinions and then justify why. It requires students to identify faults and refine methodology, analyse data and present it in a fashion that the general public can understand. Perhaps most important is that it aides students in identifying how they learn, engaging them in the process and challenging them to think differently. Though this comes with challenges, the result is that when they graduate, Biology students have more than an understanding of life in a biological context. They graduate with a set of skills that will enable them to participate fully in the reality of life outside of the school.

References

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