Teaching Science in the Humanities Classroom

Jan Oosthoek - School of Historical Studies – k.j.w.oosthoek@ncl.ac.uk

Introduction

In 1959 the famous author and scientist, C.P. Snow presented a lecture in which he argued that the critical intellectual weakness of the later 20th century was the separation of humanities from sciences (Snow, 1963). This divide between sciences and humanities has become part of our intellectual baggage and is passed on to our students. As a result students in the humanities avoid science in order to focus on "real world" issues. With the emergence of global warming and other global environmental threats as real world issues, humanities students have to be educated in understanding the intricacies of climate change, ecosystem functions, toxicology and other areas of environmental research.

Unfortunately, few humanities undergraduates have an understanding of the scientific processes that underlie these issues and lack the scientific training needed to do so (see Schlosberg & Sisk, 2000). This produces humanities students, incapable to fully understand environmental issues.

This poster presents the results of a small project that aimed to identify in more detail the problems facing students learning in science-based courses, and explored solutions to these difficulties. The project included the following elements:

- To establish the causes of the resistance amongst humanities students to science, including curricular and institutional barriers.
- Experimentation with a different teaching strategy involving the use of narrative as vehicle of science within the humanities.
- Suggestions for improvement of teaching and further research.

Curricular and institutional barriers

A survey among 300 humanities students at university level showed that roughly a quarter to a third studied one or more science subjects at A-level. (Figure 1). The fact that so many humanities students drop science at A-level is largely due to curricular and institutional barriers and include:

- Students locked in disciplinary structures from GCSE level → limits development of interdisciplinary thinking and perspectives.
- Specialization and separation of disciplines in different faculties and departments at university level (Klein, 1998).
- The organisation of education at secondary and tertiary level results in disjoint programmes with separate streams for humanities and science students.
- Benchmark statements exclude interdisciplinary perspectives and focus on core elements of a particular discipline.
- Funding provided by separated humanities, science and social science funding bodies.

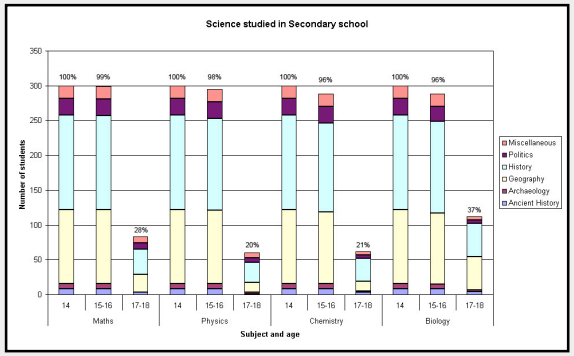

Figure 1: percentage of students studying science at GCSE and A-level

Student attitudes to science

Student attitudes and knowledge towards science is in part the result of the way it is taught and the failure to make it relevant to every day life and contemporary problems. This is partially visible in the survey results among 300 students (Figure 2):

- A fifth of students perceived science as difficult.
- The combined responses Dull, Not Interesting, "Did not enjoy it" and "science does not allow discussion accounted for 50% of the students → science is not necessarily difficult but perceived as dull, uninteresting and not worthwhile pursuing.
- Some students indicated, "in science all the answers are known".

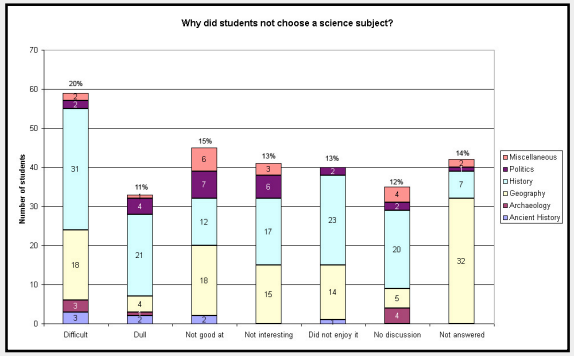

Figure 2: Qualitative reasons for not studying science at A-level

Science has an image problem caused by the way it is presented, and examined at secondary school level. These problems include:

- Science does not connect to the daily experiences of students → Dehumanization of sciences as well as dehistorisation.
- Teaching does not include critical thinking.
- Students are result driven: the answers matter (the Wikipedia culture), not the methodology.
- The exam culture does not require answers with analysis or critique resulting in shallow interpretation of facts and no understanding of complex issues.
- Students do not like probability because it is difficult to understand. Ready made unambiguous answers are easier to understand and to use.

Concepts

To get better grips on the understanding of science among students they were confronted with a list of science concepts used in the teaching of environmental history. The first three concepts are large overarching hybrid concepts that connect a whole host of other ideas and concepts. The second group were singular concepts or related to numeracy (Table 1). The results of the test indicate that students struggle with providing qualitative descriptions of large overarching concepts such as global warming and ecosystems.

General conclusion: presenting large complex scientific ideas as singular concepts without providing any context makes it difficult for students to grasp what it means.

	Correct	Incorrect	No answer
What is global warming?	38%	60%	2%
What is an ecosystem?	21%	69%	10%
What is evolution	83%	17%	--
What is CO_2	40%	60%	--
How long ago ended the last Ice Age?	68%	30%	2%
What is exponential growth?	62%	36%	2%

Table 1: Knowledge of scientific concepts of humanities students at university level

Embedding science in narratives

During a teaching trail in the context of an environmental history module, complex scientific concepts were embedded within different historical topics and linked to debates. The science was embedded in narratives.
Result: Response was much more positive and students engaged more actively with the issues presented.

In a humanities course, science has to be humanised in order to connect it to the "real world problems" humanities students are interested in.

Contextualizing is a method of embedding people, artefacts, places, animals, etc. in the fabric of time, culture and space. It is a vehicle for humanizing knowledge in a humanities type inquiry. The humanities can form an interface for interdisciplinary enquiry, e.g. environmental history uses time, space, culture, environment and history as vehicles of integration (*history and environment as context*) and crosses over into the realm of science.

Science **conceptualizes** physical data by abstracting it to its mathematical or other formalised form or empirical core and linking this to general underlying patterns and processes, sometimes referred to as laws or principles.

Conceptualizing strips real world events and processes from its context that humans need to understand the world they live in and to give it meaning (Nikitina, 2002).

Conclusion: Science can be humanised by stripping concepts of mathematics and abstract notions and transform them into narratives which makes it possible to integrate into humanistic discourse.

Conclusions

- Curricular and institutional organisation obstructs integration of science and humanities
- Science too abstract and dehumanised to appeal to students
- Narrative as vehicle of science can make science accessible and relevant too humanities students.

Future work:

- Students do not like probability but ready made unambiguous answers. *Question*: is this due to unimaginative, non-multidisciplinary secondary education in a society that is result driven?
- Longitudinal study of humanities students interests and their backgrounds.

References

Klein, J.T. (1998), "The discourse of interdisciplinarity", *Liberal Education*, Vol. 84, No. 3, 4-11.
Nikitina, Svetlana (2002), *Three strategies for interdisciplinary teaching: contextualizing, Conceptualizing, and problem-solving* (Cambridge MA: Harvard Gradual School of Education).
Schlosberg, David, & Thomas D. Sisk (2000), "The environmental science/policy interface: crossing disciplinary boundaries with a team-teaching approach", *Political Science and Politics*, Vol. 33, No.1, 75-79.
Snow, C.P. (1963), *The two cultures: and a second look* (Cambridge: CUP).

Download this poster from www.eh-resources.org/documents/TL_poster.pdf