

## How Do Students Learn Critical Thinking? Challenging the Osmosis Model

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### **Abstract**

In teaching CHIP, it is often assumed that students learn critical thinking by being exposed to it, as if absorbing it through osmosis. Moreover, assessment guidelines tend to consider this ability only for higher marks. The authors of this paper believe, however, that critical thinking should be trained as a central skill: in this contribution, they share their experiences in teaching critical thinking directly. Specifically, they lecture on critical thinking and argumentative writing in a second-year module that also includes research methods training. Several journal articles are discussed in class, and the exam itself consists of critiquing two research reports. In this course, quantitative and qualitative research are discussed by two different lecturers. However, co-teaching is not framed as a debate: the lecturers aim to avoid both providing a stale compromise and presenting the two approaches as irreconcilable. The authors' experience with this module supported their initial worries about the osmosis model. Most students were capable of pertinent critical observations on research, arguably because they absorbed this skill from their previous courses. However, integrating isolated comments into a coherent critique was challenging to many, and it took much effort and guidance from the lecturers.

## How Do Students Learn Critical Thinking? Challenging the Osmosis Model

Critical thinking has a paradoxical status in today's higher education. On the one hand, it is praised as an essential skill to be acquired in most university degrees; on the other hand, critical thinking is often relegated to the sides. In assessment criteria, it is usually the hallmark of a 1 or a 2:1. In syllabi, critical thinking is often a central goal; however, it rarely has dedicated lectures, let alone dedicated modules. The answer to this paradox may be quite simple: lecturers often assume that critical thinking is an academic value students will absorb simply because they are constantly exposed to it (see Abrami *et al.*, 2008, for a review of strategies to teach critical thinking). In this paper, the authors briefly develop their critique of this approach, and present a practical alternative: teaching critical thinking directly.

The idea that students simply absorb critical thinking may be described as an 'osmosis model'. While the term itself originates in biology, its metaphorical use is widespread enough to be accounted for in the OED: 'osmosis [...] 2. the process of gradual or unconscious assimilation of ideas, knowledge, etc.' The central concern of this paper is that learning through osmosis might be inappropriate in the case of critical thinking.

This paper is not an empirical study on teaching strategies, neither is it a set of guidelines for teaching critical thinking, but the result of the authors' reflection on a module they teach at the University of Surrey. The first author participated in the workshop that led to this special issue. This experience convinced the authors that CHIP is committed, as a field, to develop psychology students' critical thinking. Hopefully, the

argument made here for teaching critical thinking directly will inspire readers to reflect on their own approach.

### **A brief description of the module**

Critical thinking is taught to Surrey psychology students as part of a module with a broader scope: 'Applied critical thinking and qualitative data analysis.' CHIP is taught in the first year through a specific module, introducing students to the thinking of important figures, intellectual movements and kinds of critical ideas that have structured the history of psychology. This second year module builds on that foundation. It does not cover the history of psychology, but instead aims to develop skills in applying the critical ideas presented in that module to contemporary psychology. By teaching critical thinking explicitly, students are required to engage in debates about epistemology and methodology. This is not an additional requirement, on top of learning a topic area within psychology, that only students seeking top marks need engage in. It is the central objective of the module. This means that critical analysis of becomes a necessary component of student learning rather than a supplementary aim of the module. However, this approach is not without its challenges, as detailed in the following sections.

Several lecturers have been contributing to this module; the authors of this paper have been engaging with mainly critical thinking and critiquing quantitative research. The module has been taught for three years now, as a compulsory course for second-year psychology students. (Some changes have taken place in the second year: most

notably, the first author of this paper was co-opted, and an essay-type assignment was replaced with an equivalent exam.) This paper will only focus on the critical thinking component, and will not detail students' acquisition of qualitative research skills.

Of the eleven lectures of the course, five focus on critical thinking. The first of these sessions introduces the goals and structure of the module and the concept of critical thinking. Some basic tools for critical thinking are discussed, such as argument maps, and we recommend a (very compact) reading list (esp. Bonnett, 2011). The objective of this session is to enable students to read research papers as argumentative writing. The second session focuses on quantitative research, via a section-by-section group discussion of two short papers. A brief lecture is also delivered on the theoretical bases of quantitative research, rehearsing such classical issues as correlation-is-not-causation and Occam's razor. The third session (delivered by another lecturer) takes a similarly close look at a qualitative paper through the lens of Yardley (2000). The objective of these two sessions is to enable students to identify research findings and critically assess their ontological, epistemological and methodological basis, and from this evaluate the meaning of the research. The fourth session discusses argumentation and academic writing, with the scope of helping students to effectively convey their critical analyses of psychological research. The fifth session is entirely dedicated to classroom discussions. Two papers are analysed, one quantitative and one qualitative, both on the same topic. The objective of this session is to enable students to contrast different approaches to research in order to highlight the diversity of fundamental assumptions underpinning them and to consider if they might be reconcilable. This final session thus prefigures the

task on which the students are evaluated.

Assessment is practical: students have to write critical essays integrating information from two papers. One uses quantitative methods, the other one qualitative, but they address the same issue (e.g. emotions and weight loss). Students are advised that this task needs no memorisation: they may have copies of the two papers on their desk, and they are not expected to use any particular set of references or concepts. In order to pass (a minimum mark of 40%), students are expected to make a few pertinent observations on the papers' methodologies, even though embedded in a mostly descriptive essay. For a first (70% and above), a large number of critical observations are expected, as well as a coherent narrative for the whole essay, and some discussion of the more challenging aspects of research (such as epistemology).

Three sources of information have served the assessment of the module thus far: students' feedback, their performance in assessments, and the lecturers' own reflection. According to University regulations, students completed feedback questionnaires between the last lecture and the exam, and the lecturers received this feedback after the results had been published. While many students received good marks, many of them did struggle with specific issues, as explained in the following section. (After the exam, students received comprehensive feedback in form of a collective email message.)

The above approach likely to be familiar to most of university lecturers. Two pedagogical options, however, intentionally depart from what seems usual in similar modules. If discussing research papers is the staple of many psychology courses, giving direct instruction on how to critique research seems to be rare. On the other hand, co-

teaching on similar modules often involves debate, especially when (like in the present case), qualitative and quantitative research are taught by different people; the authors have once again decided against the more popular option.

In the following two sections, the rationale for direct teaching and for juxtaposition without debate is explained. The argument is highly personal. The authors do not wish to frame the module as a revolutionary alternative to previous courses, let alone an ultimate solution for teaching critical thinking. Rather, they wish to share reflections on an ongoing experiment.

### **A critique of the 'osmosis model'**

As explained in the introduction, the central issue of this paper is the 'osmosis model'. Students are often expected to absorb the key skill of thinking critically by merely engaging in discussions with their lecturers and their peers. The authors voice the concern that osmosis is inefficient, and therefore they teach a module in which critical thinking is directly addressed.

The central ethical and theoretical concern about osmosis is that it seems inconsistent with critical thinking itself. If the principles of critical thinking are not openly discussed, then these principles themselves circumvent critical scrutiny. While this worry may seem pedantic, the problem is often encountered in practice. For example, one of the issues discussed in this module is the overuse of certain points of criticism: 'the sample is small and/or not representative' is probably the most popular of such statements. Small samples drawn from convenient populations (esp. undergraduate

students) are indeed a major limitation of much psychological research (see Henrich *et al.*, 2010). But a study on astronauts may be interesting precisely because they are not representative of the general population; and very large samples, not just small ones, may also have an adverse effect on the results of research (e.g. by making small differences statistically significant; see Field, 2013). In order to turn critical thinking on itself, and make sure it is more than a repertoire of smart-sounding phrases, the authors chose to discuss it directly.

There is also research evidence against osmosis. In a meta-analysis of over one hundred studies on teaching critical thinking, Abrami *et al.* (2008) found only one ineffective approach: engaging students in deep reflection and debate over the course topic, hoping that they will distil how to think critically. Abrami *et al.* called this 'immersion,' but it essentially overlaps with 'osmosis.' (Immersion had an effect size of less than one tenth of a standard deviation, while all other approaches had effect sizes between one third and one full standard deviation.) The relative ineffectiveness of osmosis should not come as a surprise. Critical thinking is quite far removed from the way people think in their everyday lives. The whole literature on cognitive biases can be read as comparative analysis of what academics and laypeople find to be logically correct (see Greenwald, 1980, for an engaging synthesis): the result is, of course, that everyday logic deviates substantially from the academic standard. It is thus unlikely that critical thinking will be osmotised.

The authors' experience with the module seems to support concerns about osmosis. In their feedback after the module, several students complained about being

taught something they were already familiar with; they were especially discontent with being taught how to write sentences and paragraphs. Argumentation is a skill that needs lifelong development, and students' work often confirms the need to rehearse the basics of academic writing. However, the students' impression that they knew enough already should not be dismissed. In his first lecture, the first author asked students to critique the abstract of an experimental paper. He was so satisfied with the students' answers, that, for a while, he doubted the necessity of this module. Future discussions, as well as exam results made him reconsider the students' apparent prowess. For example, the conclusions of some essays contradicted the contents, and the language was sometimes inadequately harsh (e.g. 'downfall, 'dismal' etc.) Common but serious mistakes were present in a few essays, such as inferring causality from correlational or qualitative research. Overall, the patterns seen in the assignments and exam scripts are in contradiction with both the lecturers' and the students' initial impression that osmosis was successful. However, these moments of doubt gave the authors first-hand experience of why osmosis may feel sufficient to many.

Finally, the importance of what is 'absorbed' by students from their lecture(r)s should not be dismissed. Since quantitative and qualitative research are both addressed in this module, special attention is paid to what students gather about the relationship between these two approaches. This discussion is developed in the following section.

### **A word on co-teaching**

Discussing both qualitative and quantitative research can be difficult within the



same programme of studies, let alone within the same module. This is the case because methodological differences often reflect divergent views on knowledge, reality, and the role of science in society (see Lincoln *et al.*, 2011, for a synthesis). We chose to handle this challenge by co-teaching: qualitative and quantitative research were discussed by two different lecturers, but without any debate between them. Both lecturers were present at almost all lectures, and they often engaged with each other's material. However, they neither debated each other, nor did they suggest a compromise. They opted for a side-by-side presentation of the two approaches, trying to neither exacerbate nor downplay the tensions. This approach was preferred for two reasons.

On the one hand, some research-related values may be genuinely irreconcilable. In her discussion of epistemological debates in psychology, Stainton-Rogers (2003) critiques an approach she labels the "'fluffy bunny" solution' (p. 9). Academics often feel compelled to present integrative, balanced, unemotional compromises between competing theories. Such solutions, however, tend to brush over substantial differences in values and worldviews. Just like appeasing a personal conflict with a gift of a card or a plush toy, textbook compromises on epistemological debates tend to underestimate the core tensions. Co-teaching in this module allows for genuine advocacy on both sides. Furthermore, it is hoped that the discussion of the lecturers models a more sophisticated and nuanced style of engagement with the underlying assumptions and interpretations, demonstrating the value to be gained from their diversity.

On the other hand, debate is but one way of approaching tensions. Bryman (2012) explains how the differences between qualitative and quantitative research may be

framed as epistemological, thus leading to a difficult debate; but the difference can also be framed as technical, and then integration is possible. Quantitative research in such subfields as feminist or LGBT psychology is often quantitative, but axiologically closer to qualitative research (cf. the quantitative and qualitative studies in Coyle & Kitzinger, 2003). Mixed methods research (Creswell & Plano-Clark, 2011) has also proved that quantitative and qualitative methods can coexist in practice. Moreover, quantitative and qualitative research are neither monolithic, nor uncritical of their own limitations. Researchers are often well aware of their own paradigm's limitations (Lincoln *et al.*, 2011). Finally, epistemologies can also move along a continuum, as exemplified by critical realism (Bryman, 2012).

Student's critical analyses convinced the authors that the quantitative-qualitative divide needs to be addressed with even more care. When integrating information from one quantitative and one qualitative paper, many students praised one and dismissed the other. Qualitative and quantitative research were plotted against one another in quite emotional terms, and the methodological faults of the preferred paper were clearly downplayed. This seems to support the idea that debate is better avoided in favour of more sophisticated ways of addressing tensions.

### **Conclusions**

It is often assumed that psychology students learn critical thinking by being exposed to it, as if absorbing it through osmosis. In this short paper, the authors argue for a more direct approach. They teach critical thinking as part of a second-year module, mostly

lecturing on research designs and argumentative writing. Although two different lecturers discuss quantitative and qualitative research, co-teaching is never framed as a debate and did not present the two approaches as irreconcilable. Exams require no memorisation, as students have to critique familiar research articles. The explicit focus requires students to engage critically with the assumptions underpinning the ontology, epistemology, and methodology of the research, rather than presenting this form of thought as a supplementary aim of the module. After a more historically-focused CHIP course in the first year, second-year students gain more insight into conceptual issues in psychology.

Classroom discussions partially supported the osmosis model: students were indeed capable of critical observations at the beginning of the module, arguably because they absorbed elements of critical thinking in their first year. However, the final exam revealed more subtle issues: writing a coherent critical essay was challenging for many students even after direct instruction. We therefore urge their colleagues to ensure that students are not just capable of identifying limitations in research, but also confident in building more intricate arguments.

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