Shaping Higher Education with Students

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2.4 Interdisciplinary research-based teaching

Advocacy for a change in the higher education paradigm

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Agathe’s distinctive contribution to the case for research-based teaching is to link it with advocacy for interdisciplinarity. By its nature, an interdisciplinary approach is more likely to make students think rather than simply attempting to master a standard body of knowledge.

Professor David d’Avray

1. Introduction

According to the QS World University Rankings by Subject 2016, UCL is the top-rated university in the field of Education. Although this ranking mostly reflects the quality of research of UCL academics – not necessarily of their teaching – it certainly gives UCL academics, students and staff a privileged position from which to reflect on their own teaching, to suggest ways of further blending teaching with research – two inherent aspects of higher education that are too often considered in isolation. This raises the important question of how we can transform excellence
in research on education into excellence in education itself. This chapter will explore to what extent the R=T initiative can be an answer to that question.

As a PhD candidate (Forensic Anthropology, Department of Security and Crime Science) and a teaching assistant, I am lucky enough to be a student, researcher and teacher all at the same time. This is an incredibly enriching position, one which has significantly developed my personal interest in the quality of education. My involvement in the R=T initiative further developed my awareness of the lack of suitability of traditional educational models – where research stands apart from teaching – for today’s students’ needs. I will therefore explore here the benefits of the R=T model to enrich education and curriculum, specifically addressing the challenges of boundaries. I will then examine two different types of boundaries: those between research and teaching; and those between traditional disciplines. I will suggest concrete ways to contribute to the blurring of these boundaries, to help with developing research-based education.

2. Towards R=T: blurring the boundary between research and teaching

Although nowadays most academics are expected to both conduct research and deliver teaching (all at the same time), it has been demonstrated that, in reality, research and teaching tend to be conceived, prepared and delivered separately. This rather arbitrary separation between research and teaching has created a lack of balance between research-time involvement and teaching-time involvement. A major issue is that research tends to be more valued than teaching within both academia and the scientific community. In that context, many researcher–teachers focus on delivering high-quality research rather than high-quality teaching. This issue has been criticised across Europe for a number of years because it has a direct negative impact on the quality of teaching delivered to students, and also because many academics feel that teaching distracts them from their research.

The approaches taken by researchers, students and teachers can be seen as somewhat incompatible given their inherent natures. A researcher is, by definition, in an empirical process, in a dynamic of discovery; their conception is that not everything is known so far, and nothing is finite. The natural tendency of a student, however, is to expect eternal knowledge, finite verities. The position of a teacher lies somewhere between
that of the researcher and of the student. A researcher–teacher’s attitude will depend on their personal involvement in the research: the closer they are to it, the more likely they are to convey to students that verities and science are in constant evolution, able to be shaped by students’ active involvement. On the other hand, a teacher who is not directly involved in research will tend to refer to traditional bodies of knowledge that they will barely question, thereby transmitting this approach to their students. For these reasons, the expectations of researchers, students and teachers seem difficult to merge.

To bridge the gap between research and teaching, it seems sensible to suggest the development of a research-based education, where students and teacher are able to conduct research together in a classroom environment. This would free up enough time for the researcher–teacher to deliver both quality teaching and cutting-edge science, and for the learners to acquire the required knowledge and skills to be adequately prepared to conduct research themselves. The challenge is to find ways to blend R and T that work for both the teacher and the learners. Throughout his career, Professor David d’Avray, Professor of medieval history at UCL, developed several strategies to further blend research and teaching in his everyday work. To deliver research-based teaching he manages to constantly involve his students in his research – both Masters and undergraduates. In his experience, a good way to initiate first-year undergraduate students in research in medieval history is to engage with them around the analysis of ancient manuscripts. This activity, done in class, enables the students to conduct research on material that is crucial to historians, while developing their analysing, reasoning and critical skills through the observation of concrete evidence. Professor d’Avray transcribes and translates unpublished medieval documents for his undergraduates to study, thereby introducing them to source material as yet unstudied by scholars. This strategy provides students with a sound understanding of how to conduct research, shortly after entering university, which implies a very important shift in their conception of education compared to the environment of high school, where preparing students for research is hardly the primary objective. Professor d’Avray also runs courses relating to books for which he is doing research. In so doing, his students benefit from original research, while also allowing the teacher to build on the students’ feedback in class to inform and improve his or her research. Professor d’Avray therefore creates an educational environment that relies upon both research-based teaching and teaching-based research, a rarely achieved balance between R and T in higher education to date. This is a great example of a successful way of linking R and T where
learners are conceived as partners in both research and teaching by the teacher (Healey 2014). This educational strategy proves highly beneficial to the blurring of the boundaries between research and teaching, but also between teachers and students, another artificially set boundary.

Another issue when trying to implement research-based teaching in higher education is the existence of boundaries between undergraduate and postgraduate students. Indeed, my experience both as a student and as a PGTA has made me realise that within the broad category of learners there is a gap between the expectations of teachers for undergraduate and Masters students, because the latter are expected to conduct more independent research. This can create an imbalance between the teacher’s expectation of their students and the students’ expectations of doing research, and of being adequately prepared and supervised to do so. PGTAs can play a key role in facilitating the transition from undergraduate to postgraduate, and in helping both students and teachers reach their respective objectives. Thanks to their position, experience and age relative to the students, PGTAs (as students–teachers–researchers themselves) are uniquely positioned to act as a sort of ‘intercessor’ between learners and teachers, developing a deep and up-to-date understanding of the actual needs and expectations of the new generation of learners (Healey 2014). This is certainly the main asset of PGTAs, whose perspectives are different from those of students at undergraduate, Masters and even PhD level. Indeed, as a PGTA, I developed an integrated approach that effectively blends research and teaching by putting knowledge into historical perspective, and within its production context, to provide a comprehensive vision of a field (Morss and Murray 2005). From a practical perspective, an integrated approach can be easily implemented, by making sure that students are fully aware of the entire scope of skills, resources, facilities and expertise available (i.e. libraries and staff), not just those that are thought to fit their area of study or are available within their home institution. Even more important is that students use this wide range of information to make critical connections between fields and concepts. As a PGTA, I have noticed that some Masters students often miss this global vision. I then try to make sure that I personally inform students and direct them to relevant members of staff who can help, as early as possible in the academic year.

On a more theoretical ground, putting knowledge into context is critical to help students discover that research is inherently an ongoing process, that it evolves constantly and cannot, therefore, provide absolute and definitive answers to students’ questions or to any topic discussed in the literature or media (Bell and Kahrhoff 2006; Walkington 2016).
This can be concretely achieved with object-based and problem-based learning activities in a classroom setting (Biggs 1999; Dolmans et al. 2005). Object-based learning is an educational approach based on the handling of an object that enables the creation of quick cognitive links between a tangible thing and intangible theories or concepts (Bonwell and Eison 1991; Bell and Kahrhoff 2006). This empirical process facilitates the understanding of, sometimes complex, theories by the handler of the object, and is therefore acknowledged as an effective way of learning (Bonwell and Eison 1991; Bell and Kahrhoff 2006). In object-based learning, the object is used as a way to concretely test some aspects of an approach as well as its challenges, via the intellectual process of midwifery, known as maieutics, where the learner ‘gives birth’ to knowledge they were not aware they had acquired. Maieutics has proved effective for deeply understanding a process or concept and also for keeping a long-lasting memory of it. This learning approach can be done with a great diversity of objects – from fossils, to maps, to paintings – and can thereby be applied to a wide range of fields. As part of my research-based teaching activities to Masters students in Forensic Anthropology, I use objects (such as bones and X-ray images) as a concrete starting point. We then use these objects to discuss, as a group, the methods, practices or paradigms from a range of disciplines (such as Justice, Medicine, Forensic Sciences, Archaeology, History, etc.) that used to be the norm in our field before being amended or refuted, but that contributed to inform – sometimes directly – the methods currently in use. This approach is usually very well received by the students, as evidenced by both what they say and their written coursework. It allows them to quickly incorporate a critical evaluation of the current methods and stimulates their ability even to suggest avenues for improvement. However, this integrated approach is not implemented to date in many fields, something I came across as an early-career researcher. For instance, I noticed that medical schools in mainland Europe only offer very cursory training in the history of medicine and, more importantly, they draw no conclusions from medicine’s past practice into the way it is taught and applied today. This is regrettable, as teaching the history of medicine would definitely help students understand to what extent the body of knowledge in medical science has constantly evolved, and that what they consider to be a scientific truth today may actually be challenged tomorrow.

Despite being a very efficient way to deliver a research-based teaching, object-based learning is not always easy to set up, especially for certain subjects, class configurations (i.e. large groups in amphitheatres) or type of learners (i.e. various background and receptivity) (Cain
2010). Although well described in the literature, I believe the most efficient way to understand the challenges regarding the implementation of object-based learning in a classroom setting is to experience it personally, which I did from two different perspectives: as a teacher and as a learner. For example, for a particular activity in the context of a practical class, I asked the students to discuss in pairs a copy of an anonymised medical X-ray that I had used for my own research. I noticed that the activity was received differently according to the level of familiarity of the students with X-ray images, so that not every student was able to discuss the object in a way that would have facilitated their understanding of the problems I wanted to lead them to realise. I had a chance to experiment with some of these challenges myself as a learner by joining a workshop on object-based learning delivered in the UCL Art Museum. This experience from a learner’s perspective made me realise to what extent cultural differences – including language, background (i.e. humanities vs. ‘hard’ sciences) and personality – and learning type (i.e. visual, spatial, auditory, etc.) play critical roles in the success of an object-based learning approach. Being aware of the logistical and intellectual challenges of object-based learning is of great help for the teacher to tailor their activities, as well as their expectations, in accordance with the diversity of their students.

I believe developing this integrated, active, research-based teaching approach is crucial for students to understand the limitations of knowledge and education, and for them to appreciate the research process. Beyond that, this approach is very important for encouraging the development of students’ critical thinking as well as their resilience, two paramount skills in the building of their curriculum as well as their identities (Biggs 1999; Walkington 2016). This is something I have never been told by my professors or supervisors and that I discovered empirically, but which is a critical step toward prepare students to conduct research in the fields of their choice. I think this is another way to develop effective research-based teaching that enables students to adopt the expected conceptions to conduct research while being taught in class. I appreciate that this change in the conception of teaching represents a major shift compared to the school environment, where students are used to being given verities by their teachers. The process takes time, and should therefore start as soon as students begin university, thus leaving a legacy for the next generation of undergraduates that the first cohort of students – now postgraduates – will teach. Significant gains in developing effective research-education will be achieved if this transdisciplinary and transgenerational dialogue is initiated.
3. The blurring of traditional disciplinary boundaries: an effective way towards a research-based education

Blurring arbitrary traditional disciplinary boundaries will foster the development of a cross-disciplinary research strategy, where research and teaching are blended in a natural fashion. Because my background is an intimate blending of the Humanities (Archaeology and Anthropology) and Sciences (Biological Anthropology and Forensic Sciences), which I completed in both France and the UK, along with much professional experience abroad (i.e. internships and scientific collaborations), multidisciplinary transnational dialogue is inherently part of my education, teaching and, in a broader context, identity. As a PGTA and a researcher now, I build on my own experience as a student as well as on the experience of inspirational professors I met to inform my daily practice, both in teaching and research. I am therefore trying to implement a cross-disciplinary approach in my capacity as a PGTA, at two complementary levels: internal – within UCL – and transnational. I am directly involved in interdepartmental courses, workshops, conferences and publications between the Department of Security and Crime Science, the Institute of Archaeology and the Department of Anthropology. I have also initiated several multidisciplinary research collaborations between UCL and universities abroad. These collaborations and networks have allowed me to discover theories and methods used outside the UK which I now use as teaching material on an ad hoc basis during my teaching, thereby expanding the traditional scope of the topic.

The importance of overstepping traditional disciplinary boundaries to facilitate the implementation of research-based education is acknowledged by several teachers, including Professor d’Avray. He supports extending the research-based approach he uses with ancient manuscripts to support learning in various other fields, by making ad hoc adaptations for the given discipline and resources available. Some might argue that this cross-disciplinary research strategy is mostly applicable to ‘humanities’ because of their intrinsic nature. However, I am confident this approach is also applicable to the so-called ‘hard’ sciences, for which the educational model is traditionally considered as consisting of a first phase (first-year undergraduate) of acquiring the methods, but with very little actual research. From my own experience, this conception mostly relies on habitus and can absolutely be adapted to the hard sciences, by following the example of humanities and immersing students in research right from their first year, as Professor d’Avray has done for several years.
with his students. From my perspective as an early researcher–teacher in both the humanities and sciences, I am convinced that the implementation of such an interdisciplinary approach requires taking a step back from one’s field and to start working on it – not just in it. It is important to bear in mind that the shift in the educational paradigm may take some time. It is therefore all the more important to address the issue and to spread the word, as the UCL ChangeMakers and Connected Curriculum are doing. In this view, it is crucial to try applying new methodologies with first-year undergraduates, to allow sufficient time for these new approaches to blossom throughout the students’ curriculum. The blurring of artificial, traditional boundaries between disciplines will lead to a critical change in the education paradigm that will be hugely beneficial to both learners and teachers.

Professor Peter Abrahams, of the Warwick Medical School, has developed a novel multidisciplinary educational approach for his students, who benefit from a wide range of innovative, user-friendly, technology-based methods and tools (such as applications for mobile phones and tablets, online platforms, as well as songs). Because this educational strategy provides diversified resources and approaches, it effectively supports students’ learning, including doing research. Linking technology, education and research works very well in stimulating learners’ attention and curiosity, as well as ensuring a long-lasting memory of a given topic, a phenomenon also reported in the literature (Ballantyne and Knowles 2007). Even more interestingly, this educational strategy enables students to play a key role in the development and improvement of teaching materials. They can tailor these to their own needs thanks to their up-to-date skills in technology, and they thereby inform Professor Abrahams’ practice and enable him to develop his own technological skills. In so doing, a mutually beneficial, balanced student–teacher relationship is built (Healey 2014). Professor Abrahams’ practice is a fantastic example of a successful transdisciplinary approach that effectively facilitates the delivery of research-based teaching.

Another inspirational and successful example of cross-disciplinary research-based teaching is the Centre for the Forensic Sciences (CFS) at UCL. The CFS is a research-based education initiative directed by Dr Ruth Morgan (who is also my PhD supervisor). It was established in 2010 with the aim of delivering cutting-edge, research-based teaching in a range of disciplines under the large umbrella of the forensic sciences (geosciences, chemistry, genetics, statistics, etc.). The novelty of this educational strategy relies on the development of
cross-disciplinary classes that blend together disciplines that, traditionally, have not necessarily been linked together in higher education. For example: archaeology with forensic sciences; psychology with forensic anthropology; or even architecture with crime science. In parallel to teaching time, multidisciplinary, research-based workshops, seminars and conferences are also run throughout the academic year. These regular events are fantastic opportunities for students (of all levels) and staff to engage in stimulating dialogue with speakers from both research and practitioner backgrounds (i.e. police officers, crime-scene technicians, lab technicians, forensic pathologists, etc.) who represent a variety of disciplines both across and outside UCL, in the UK and internationally. The CFS demonstrates how it is concretely possible and enriching for both learners and teachers to work within an international, multidisciplinary environment while maintaining a good balance between research and teaching-time involvement. The suitability of this cross-disciplinary, research-based educational model for today’s generation of learners is evidenced by the ever-increasing number of students at the CFS and the success of its flagship and highly distinctive multidisciplinary MSc degree in Crime and Forensic Science, which clearly meets the need for strong research-based training. Overstepping traditional boundaries, including in the hard sciences, is a valid model applicable to a variety of fields, and one which also fosters the development of new, stimulating fields.

PGTAs can play a crucial role in the implementation of a cross-disciplinary educational approach. A concrete example is the one-hour workshop at the UCL Teaching and Learning Conference, which I co-led with a fellow graduate teaching assistants (GTA). It gathered a very diverse panel of GTAs from a range of nationalities and backgrounds, in subjects as diverse as geography, English, German, biochemistry engineering and forensic anthropology). Discussions included the need for solutions to better understand one another’s approaches, and to find ways to adapt them to a particular group or subject, in the common interest. The workshop demonstrated the power of interdisciplinary dialogue to inform one’s teaching, by merging approaches from the humanities and hard sciences. Thanks to their ability to directly contribute to the implementation of novel areas for collaborations between researchers, teachers and students, in disciplines that do not necessarily have a long-term history of integrating one another’s approaches, GTAs can play a key role in blurring the boundaries between student and teacher, as well as between traditional disciplines. GTAs thus represent a great hope
within higher education for implementing research-based teaching, for a change in the higher education paradigm that calls for all stakeholders (academics, GTAs and the students themselves) to engage in a constant, balanced and constructive dialogue.

4. Conclusions: R=T – a common endeavour for a common concern

GTAs can play a key contributory role in helping to bridge the gap between research and teaching, and between students’ and teachers’ expectations when it comes to implementing research-based teaching. In this view, interdisciplinary work that involves different stakeholders in higher education is key to merging research with teaching, which in turn will contribute to creating a more suitable academic model.

Concretely, research-based education can be implemented by employing a number of suggestions that I have experienced myself – both as a student and a GTA. These could be developed as a common endeavour between students, teachers (including GTAs) and researchers (see the box on recommendations).

First, it is critical that students acquire research acumen by being involved in research projects the moment they start university. This will develop their professional, personal and intrapersonal skills that are critical in the building of students’ identity. Developing students’ interest and skills for research during class time can be facilitated by creating stimulating cross-disciplinary environments. A fantastic benefit of this approach is that it can be applied to almost any field. In this view, interdepartmental classes (i.e. archaeology and statistics; ecology and social anthropology), seminars, workshops (such as object-based handling in museums for both students and staff), research projects and collaborations must be encouraged. Involving collaborators from abroad can add enormous benefit, not only to improve the cohesion of these multidisciplinary projects, but also to develop students’ awareness of other approaches that they may find helpful to support their learning – as I experienced at UCL with the R=T initiative. Cross-disciplinary educational strategies can prove greatly beneficial in preparing students to conduct research and, beyond that, to develop a more balanced relationship between students and teachers so that they learn from one another. While in theory these integrated, multidisciplinary approaches are supposed to be applied already in higher education, in my experience, for the most part, they tend to remain ideal goals, still to be achieved to date.
These suggestions, based on first-hand experience in higher education, will foster a new academic model based on a more homogeneous blend of research and teaching, stepping forward towards achieving excellence in education.

**Implementing research-based education: recommendations**

- **Involve students** – including first-year undergraduates – in hands-on research projects directly relevant to their teachers’ research, for them to acquire the empirical nature of the research process.
- **Suggest object-based and problem-based learning approaches** to facilitate the development of students’ critical minds.
- **Create interdepartmental seminars, conferences, events, research projects and collaborations** to facilitate cross-disciplinary education.
- **Invite external speakers, including from abroad, to share their experience and views on research.**
- **Develop internships and professional placements, including abroad, to broaden students’ conception of their field and topic of interest.**

**References**


