

## Reflections upon Teaching Complex Subjects: Water, Climate Justice and Health

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### Abstract

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*At a time when access to safe, potable water has become officially a human right, the authors have developed and taught a water, justice and health module as part of a new MSc Climate Justice programme. The programme has both UK and international students from wide ranging backgrounds including engineering, environmental management, geography, social science, public health and community development. This means that each student brings different experiential filters to the topic and different expectations about the relevance of the topic to themselves and their future careers, to their own cultures and to the world in general.*

*Teaching and assessment methods, modes of delivery, expectations and outcomes for both staff and students are explored here and the question is raised as to whether a topic that is so complex, but which generated great interest for the students, was delivered effectively and what lessons could be learned from it.*

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**Key words:** Climate justice, ethics, water management, public health, environmental protection, teaching with complexity

### 1: Introduction

Climate justice is a new kid on the block in terms of its aim to solve an emerging and very complex set of issues, including gender, health and economic development, food and poverty, security and conflict, with the added stressor of climate change, which is exacerbating deficiencies; particularly in the developing world. One of the key components to ensuring climate justice is the provision of safe and reliable water and sanitation services and in 2010, it was agreed for the first time by the UN Congress that access to water and sanitation should be a basic human right.

Against this backdrop, the authors developed a module to explore the concepts of water, justice and health as part of a new Climate Justice MSc programme at Glasgow Caledonian University. The programme is supported by the Climate Justice Centre, which is a repository of climate justice research, developed in partnership with the Mary Robinson Foundation. The programme was first delivered in 2015-16 and has annually grown in student numbers in each subsequent year.

The module explores the key water issues facing the world, including public health and education; the global nexus of water, energy and food; community engagement and economic development; as well as our global water footprint. The security of water supplies in times of stress and conflict and the ethical issues that relate to water as a human right are also considered. In addition, the regulatory and justice frameworks that dictate how different countries manage their water resources, whether singly, or as a resource shared with a number of other countries, are investigated.

Our students come from a range of countries and cultures (USA, Italy, Greece, Hungary, Polynesia, Bangladesh, Africa, and Scotland) and have different disciplines as their backgrounds including engineering, environmental management, geography, social science, public health and community development. This means that each student brings different experiential filters to the topic and different expectations about the relevance of the topic to themselves and their future careers, to their own cultures and to the world in general.

### **1.1: Learning and teaching approaches**

Our goal was to achieve a quality product, both in terms of the materials and information we delivered and the way we delivered the module. How to judge whether this was excellent was another concern. There are many barriers to ensuring quality of teaching (Carbone et al., 2019), not least adapting to the learning needs of diverse student groups in the light of widening participation and finding time to engage in critically reflective teaching practice, whilst coping with a variety of other demands to achieve key performance indicators and ensure an excellent student experience despite varied cultural and social norms the student cohort represented.

Carbone et al. (2019) recommend a collegiate approach to enhancing teaching performance and coping with institutional and personal barriers. By inviting in mentors or colleagues to help with delivery and by being open with our students about our reasons for raising the complexity of issues that form the water, food and energy nexus, within the water justice debate, we hoped to spike interest and shared experiences that would enhance the student experience overall in a supportive and friendly environment.

In addition, constructivist theories of learning have evolved to exploit or cope with this multi-faceted nature of student background, socialisation and learning (Piaget, 1970, Vygotsky, 1962). These require the student to take an active role and responsibility for his/her learning within the context of making sense of his/her own world. This can be hard for students from some cultures; and particularly female students, whose voice is not normally heard. These theories also recognise that an individual cannot be programmed and that their way of being depends upon nature, nurture and, most importantly, the social context they live within. It is these facets of human life that dictate how learners construct and interpret meaning for themselves, via transactions with teachers, peers and their social and knowledge networks (Laurillard, 2012). In constructivism, knowledge is not absolute or even static, but changes in the perceptions of the learner over time and depends upon the context they find themselves in at any given point in time. From this perspective, learners are the creators of their own knowledge and the teacher's role, then, is to facilitate access to knowledge sources and networks that meet both their needs and those of their programme of study (Biggs, 2003). This is where online resources are particularly applicable, as they have the ability to provide a wide range of information sources and knowledge networks that the student can engage with, guided by the teacher, who is him/herself the hub of the knowledge network for his/her students (Meldrum, 2013, Bransford et al., 2004, Wolf and Kolb, 1984).

Given the global social context of life that is facilitated by web and tele-communications today, it can be no surprise that the attitudes, behaviours, expectations and ways of learning of students today must be different from those of previous generations (Meldrum, 2013). No longer is the teacher the font of all knowledge and expertise – this is available freely via a range of online resources – but the teacher needs to be a guide to what the appropriate knowledge is, where to access it and how to interpret it (Case, 2008). This means that the way subjects are taught must also be quite different in future.

O'Byrne (2014) reflects that topics that involve a range of concepts and viewpoints including legal, political, sociological or philosophical require some learning space that allows the student to come to terms with their feelings about the complexity, facts and theories in the subject matter and also space for the teacher to reflect upon the influence of their own viewpoints on students and vice versa. This is true for the topic in this study, which explores a range of cross disciplinary topics, which is challenging for teacher and student alike.

'...not solely legal concepts, they are also moral concepts – claims about that which is 'right', and that which is 'good', political concepts – demands made for the purpose of empowerment and social concepts – articulations of common discourse about the organisation of society.....creating a space where alternative perspectives are discussed and this is only possible through an engagement with the experiences, sentiments and motivations of students.' (O'Byrne, 2014)

Social constructivism is a theory whose basis is the principle that learning is an evolutionary process during which individuals develop understanding via interactions with their physical and social environments. Language and interpersonal connections have a great influence on the learners and their new reality may be a less comfortable place until they have settled into their new environment. Carroll (2002), reflects that international students are ready to change, as they have chosen to come and knew things would be different from home, but:

'They will not find it an easy or swift process.... and will need time to think rather than just understand' (Carroll, 2002)

Kohlmeier and Saye (2018), advise that the classroom provides a space to learn new perspectives from peers who learn to respect classmates whose ideas and values may be different from their own. Social constructivism, and knowledge about it, is built between people through discussion and shared experiences. People need to engage effectively with an issue or each other, in order to feel the desire to act upon it.

Critical teaching in this context then is about opening up the discussion in order to overcome previous repressive forces and to positively change the world (Magill and Salinas, 2018). Tackling water, justice and health is one area in which we all, globally, need to make change.

Our students were encouraged to develop and understand their own worldview and reflect upon it, as against the views presented in the course content. Glasgow Caledonian University's mission is for the 'Common Good' whose principles and core values include: Integrity, Creativity, Responsibility and Confidence. These principles and values have been embedded into the module and support the students in achieving the Common Good attributes that are underpinned by them.

## **1.2: Learning and Teaching outcomes**

The learning and teaching objectives for the module were: a). to develop students who can critically investigate the key global water issues and how they relate to public health, economic development and environmental protection; b). To facilitate the understanding of students about the applicability of climate justice and in particular water issues to their personal and future professional lives; c). To create enhanced value from the development of knowledge, not just facts and theories that have no relevance to students in future (Holdsworth and Sandri, 2014).

The intended learning outcomes for the students were to: a). Critically understand the key global water issues that are currently hindering development and the role of water in relation to the principles of public health; b). Appreciate of the role of climate justice in water and in economic activity and poverty; c). Critically analyse and evaluate the important linkages and conflicts between energy and good quality, sustainable water supplies/sanitation; d). Debate the issue of agriculture - the big water user, virtual water trade and environmental impacts; e). Practically analyse the true cost of using water and our water footprint; f). Investigate and critically analyse personal hygiene and disease control – water related diseases and how to prevent them; g). Critique and evaluate water ethics, justice and culture.

In terms of content, the provision of a contextual setting that is globally oriented, with examples of real world practice and the exploration of how different decisions and initiatives affect outcomes and stakeholder groups, was essential. The students were encouraged to think about their own values and worldviews and how they would prepare them for their own professional lives. They were expected to engage personally with the material, so that they developed a literal understanding of the outcomes of the application of their new knowledge in the context of their own lives.

It was intended that a cooperative, active learning environment be developed, which challenged the students and encouraged them to take responsibility for their own learning, in true constructivist mode. By opening their eyes to issues raised in lectures and countered in seminar material, they were encouraged to develop transferrable skills which they could not only apply to and build on in practice settings, but which could also facilitate lifelong learning. The combination of lectures, seminars and tutorials allowed students to engage in reflective practice and to develop critical and systemic thinking. This was tested in two courseworks; firstly, a reflective piece on water and climate justice from the perspective of either developing or developed world countries and secondly a group poster presentation of their own choice of topic from the module content.

### **1.3: Curriculum development**

With this in mind, the module developed from the experience of the two authors; one from a water industry background and one from the public health arena to investigate how the complexities of water and health can be managed from the key perspectives of justice, with an increasing impact upon the environment and the water cycle, caused by climate change impacts. The thought processes involved finding a way to make a complex subject digestible by using the currently established water/public health authors to enable students to learn about the way the world perceives water, justice and health issues in class and to provide seminar materials for discussion that they could explore for themselves and which provided a counterpoint view or debunked the accepted view. A mixture of lectures and seminars resulted in a lively discussion which deepened as the module unfolded. The question the authors wish to explore is whether a complex subject delivered in this way has academic merit, or obfuscates the learning process by trying to introduce too many concepts in a short, one semester module.

### **2: Methodology**

A student feedback questionnaire was administered at the close of the module to explore how the module was received by the students, the impact it had on their thinking about climate justice and whether the teaching approaches were helpful in clarifying the range of aspects presented. In addition, the assessments provided and staff feedback to students was explored, given its importance to the student experience.

In addition, by reference to the courseworks, the authors reflected upon the module and its delivery and most importantly how the students had assimilated the course material, as evidenced by their engagement in class discussions and coursework submissions. The first coursework was to evaluate learning from lectures and produce a 2000-word professional report establishing the key global water and health issues and discussing how effectively they are being mitigated in either developed or developing countries. The second coursework was to produce a poster about the relationship between the geophysical reality of water and its social impact. The students could explore a topic of their choice from the course material to explore from a global or home culture perspective.

Also, the impact of student background on their perspectives and any barriers to analysing the material were considered. Finally, any difficulties for staff in managing material delivered and expectations of students were explored.

### **3: Findings**

#### ***3.1: Student perspectives***

At the end of the module, a questionnaire was administered to the students to explore their perceptions of the module content, delivery, assessment and feedback. A combination of 19 questions was posed, including Likert scales, tick box questions and opportunities to express a view. The first two questions probed the relevance and fit of the module to the programme as a whole. A Likert scale (1 = not at all relevant; 5 = very relevant) revealed that all the content was deemed relevant or very relevant with the exception of epidemiological aspects of public health, which was deemed to be quite relevant. Fit with other modules in the programme was scored to be good or very good by all students.

##### *3.1.1: Module challenges*

Given the complexity of the material, the question of challenge to belief systems was asked. Half the students felt challenged, but half did not. Those who felt challenged cited complexity of the topic, feelings of wanting to act upon the new knowledge gained. The enlightening nature of the factual information provided, newness of the concepts to the student and excitement that their concerns about the world were being addressed were the reasons for feeling challenged. Not necessarily just by the material as part of academic study, but also as a challenge to be more active in facing and perhaps dealing with the issues raised in class in their own practice. One student said:

*'It helped me to understand how water is related to societies all over the world and its importance apart from its drinking values and its sanitation value'.*

When asked how the module challenged their understanding of climate justice the responses varied. The students thought the most important issues were that we waste a lot of water and that policy needs to take a holistic view of water and its usage. Also, all students realised that water, energy and food are closely interlinked, which was a key message when debating the heavy water footprint of some renewable energies, i.e. biofuels. Water ethics being closely linked to religion and culture and the fact that water ethics are not the same for everyone on earth were also appreciated by most students.

##### *3.1.2: Water issue complexity*

When asked how complex the issue of water justice is, the students rated it as either complex or very complex. When asked what the different actors: state government, regional government, community, industry, water industry and individuals should be doing about water as a human right, it became clear that students thought that not enough was being done by any actor. Governments need to ensure that policies developed put water as a greater priority and that water legislation has both teeth and is policed effectively. At regional level, authorities need to work hand in glove with communities to ensure the community has a voice about its water issues and needs and is both engaged and takes responsibility for helping to identify gaps in provision and vulnerabilities so that they can be dealt with. Education and awareness raising is also seen as a partnership activity between government and communities. Structures need to be put into place to encourage community engagement, but also to get community feedback on how policies are working on the ground.

One student said:

*'Everything starts from the level of governance in terms of laws and regulations. The next step is the right implementation and the constant monitoring for potential infringements'.*

Communities themselves need to engage with industry and regional authorities to be heard and ensure that their opinions are considered in planning of or upgrading developments, in a similar way to which Environmental Impact Assessments influence planning and development in the EU, USA, etc.

Industries need to ensure they are working to best environmental practices to prevent pollution of water resources. They must also be held responsible for their water usage and control the volumes of effluent they produce. In the view of several students:

*'Industry should always follow the regulations and also should find new and innovative ways to reduce the water consumption, even if they are not obliged to do it'.*

The water industry should be responsible for standards and equitable distribution of clean, safe water into communities, the analysis of deep issues in the water area, control of volumes and of how much water is used as well as working in partnership with other stakeholders to ensure appropriate legislation is achieved.

On the other hand, individuals (students themselves and others) should implement what they have learnt about water issues, to increase their understanding, as well as improve policies. Also, where possible they should increase their participation in the management of water resources in their communities (developing world view). In addition, individuals can take responsibility and consideration for all water uses and the actual amount of water they need. One student said:

*'We should be more aware about the importance and the values of water and convert our lives to less water consuming'.*

### 3.1.3: Module improvement

With respect to what could be improved in the module most students asked for more opportunities to engage and discuss the material presented. This is consistent across the four years of student feedback, but with slightly different views on discussion space, either during seminars or tutorials. This is consistent with O'Byrne's view of the need for space within a course (O'Byrne, 2014) to explore and assimilate complex topics. The overseas students would have liked better linkages between topics and better explanation of concepts. One recent student said:

*'The obligation to read papers before the seminars is really good, so that modern topics like nexus and water ethics should always be available to read'.*

### 3.1.4: Tone of teaching and discussion

The students felt the tone of teaching and discussion was appropriate to the topic and the level of study, that the tutors were capable, knowledgeable and engaging.

### 3.1.5: Perceptions of climate justice and water issues

Some students felt their perceptions had changed, but some did not. However, their understanding of the issues and ways they can be tackled improved during the course. They felt more informed about the topic. There was increased awareness of the urgency for change at the highest stakeholder level if any success was to be achieved in managing water issues. One student commented:

*'After every lecture and detailed explanation I wondered how water and justice linked, which I had never thought before'.*

Another said: *'I started to acknowledge the water footprint of my way of life. And I do consider to change my habits of consumption'.*

### 3.1.6: Impact of module elements

When asked what elements of the module, if any, had the greatest impact upon them, in terms of changing or reaffirming their beliefs about water and climate justice and how relevant this knowledge was to their individual and future professional practice, the responses varied. Some thought that the water footprint had the main impact, whilst others felt that the impact of water on women and girls was of most interest and was an area they would pursue in their future career. One student felt that the lectures on the actual importance of water completely changed her perceptions of climate justice. A more recent student said:

*'It has widened my views in terms of how the changes are affecting the globe'.*

### 3.1.7: Usefulness of seminar materials

Given that the seminar materials were chosen to provide a counterpoint, to debunk or simply give a different view from the main stream approaches the students were unanimous in their view that this material was very helpful to their thinking about the subject matter. They said:

*'Alternative views are very important and help... to understand... positively or negatively...'*

*'Good. It is important to learn other views to understand and evaluate your own better. It may change your views, or at least help you to understand how others get their views'.*

### 3.1.8: What did you not like about the module?

The students seemed to feel the module went very fast and that there was much more they wanted to learn. Some would have liked less reading and some felt uncomfortable with their new, developing view of water. They were unanimously in favour of the seminars and tutorials as being supportive to carrying out courseworks and asked for even more discussion time. One said:

*'Quite eye opening and a change in perception was created'.*

### 3.1.9: Enjoyment of courseworks

The first coursework asked the students to reflect upon the course content, the second was a poster presentation on a topic of choice from the syllabus. The students found them both interesting and allowed them to think about a topic that they were personally interested in. However, they bemoaned the lack of discussion time in tutorials and interactive seminars. One student would have preferred a PowerPoint presentation to a poster, but on the whole, they enjoyed working together to produce this output.

### 3.1.10: Feedback

When asked about the appropriateness and usefulness of feedback, the students unanimously agreed that it met their expectations with the exception that more feedback that is individual would have been appreciated. One student said:

*'For me, because I am not a native speaker it was very useful the spelling corrections. The first time that happened was this module. Thanks!!'*

### 3.1.11: Would they recommend this module?

The students were unanimous that the module was very important and interesting and they would encourage others to take the module as an elective, if they were not doing the MSc Climate Justice. They thought it was useful to learn about a new side to water and health and how it has an impact on both the environment and vulnerable people. One student said it was:

*'Informative, challenging, well produced and interesting'*

*'the booklet (lecture handbook) was a really professional job and really, really useful. Everything was there in terms of terms, figures, etc.'*

### 3.1.12: Why did you choose the MSc Climate Justice?

There was a range of viewpoints about the choice of programme, which were:

- *'I am interested to study the subject area, which is related to current environmental issues'*
- *'My passion for change and educating the next generation about why we need to address all areas of climate change'*

- *'Keen interest in the environment and how climate change has become a problem for many and what has been/will be done to implement changes'*
- *'I studied civil engineering without enjoying it because of job prospects and recovering from illness. Civil engineering is often undertaken at the margin of legal and moral acceptability. After completing a DFID volunteering project in India, I joined the Climate justice programme to try and start a career working in an industry where I can broadly enjoy my work and be proud of it (not just endured).'*
- *'The strong desire to be more involved in Climate Justice, as it tries to address injustices exacerbated by climate change. Besides, as a Polynesian, I would like to bring my help and knowledge gained with you to my people, to my country and to the world'.*

### **3.2 Reflections of the teaching staff**

It was clear during the lectures that students were surprised at times by the connections to the wider climate justice debate and in particular to the gender and decision making rights regarding water and its usage. In addition, the water footprint seemed to bring alive for them how much water we use to support our daily lives and not just the amount we use for drinking, cooking and hygiene. Their introduction into cultural and social differences in different societies was also engaging for them.

In the first year of delivery, the first coursework was assessed based on the analysis of key issues, discussion of potential solutions and the development of effective approaches and the report and feedback were submitted via Turnitin. Generally, the material was used well by all students, but the analysis lacked the depth expected at this level of study. This for some students was due their command of English, which limited their ability to present cogent arguments with sufficient depth of analysis. Despite a sufficiently wide reference base in most cases, poor use of references made it difficult to identify which key issues were being evidenced for several students. Statements made were unsubstantiated in many cases, possibly due to poor referencing style. One overseas student did not use the introduction correctly so key issues were not presented until much later in the report.

The tendency to use bullet points rather than a coherent discussion was of concern in some submissions, possibly due to insufficient language skill to explore in depth. In general, the submissions did not draw conclusions as well as expected, due lack of evidence and justification for the stances taken.

The authors reflect that perhaps some specific guidance on professional report writing may have helped students to focus on what was required from the brief. This was introduced in year 2 via a series of tutorials on how to critically review research materials and carry out comparative analysis in order to produce more in-depth well-critiqued submissions. This had a significantly positive impact on student performance and so has been continued. This also gave another space for discussion of seminar materials, as they were the materials used to develop the critical analytical skills the students needed. It is noted that, as the programme has progressed the abilities of students have improved and we are now attracting abler students than we did at first. This has also changed the tutorial sessions and we now have more discussion time within them and the students still ask for more.

The second coursework was a poster submission and this in general was a better effort, due possibly to the lack of need to write in detail. Also, some previous posters were shown to the students during tutorial time and this lead to a discussion to explore what made a good poster and this was probably a useful exercise that enabled improved student performance. The assessment was based upon the effective identification of issues, the development of solutions, the clarity of communication and the use of appropriate sources and references. A range of topics were chosen, including solving sea level rise issues in Bangladesh; water access, health and education in Malawi; climate change adaptation policies; exploring the interactions between government and the environment; and communication tools for change in health, waste and sanitation.

Despite diverse backgrounds and cultures the module made them think about how they could apply the health aspects of water access and sanitation, based on their own personal experiences. This also facilitated their thinking about their current and future career health needs in conjunction with water issues, rather than in isolation from them.

It was gratifying to see how well this complex topic had been received and how it had made the students think about the new (to them) perspectives presented and the differences in how different cultures and peoples think about and deal with water justice issues. Also, it was clear how much impact even a small space for discussion with classmates and lecturers made to their ability to analyse and present information on topics of relevance to themselves as individuals and to their own countries and how they might deal in future with water issues.

#### **4: Conclusions**

It has become clear to the module team that topics that are complex, or that have interlinking or cross-cutting themes, need to be delivered with a care for the cultural context the students come from, but also for the space needed to encourage even the shy student to engage with the materials and their colleagues in the classroom. We believe that our approach is valid from an academic and social constructivism perspective and we feel very positive about the work we are doing and are encouraged to continue to update materials as the climate justice discourse develops. In addition, we will continue to broaden input from colleagues and from experienced practitioners who can work synergistically with us and help us to ensure our delivery improves. The Common Good foundations our university employs add an extra depth of social considerations to our practice, that have practical application in the world of climate justice we find ourselves in today. We enjoy learning about the diverse perspectives of the students and this challenges our knowledge and practice also. We feel justified in the approaches we have taken and the students have been supportive of our efforts. It has become clear that, even if a subject is complex, delivering it in a way that gives the student ample opportunity to open up to discussion and challenge their own pre-perceptions can work effectively. That critical pedagogy is not forfeited in the drive to explain and explore these types of topic and that is is not too ambitious a goal to deliver courses that have complexity at their core.

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