Summary of PhD research

Water Literacy and Citizenship: Education for Sustainable Domestic Water Use in the East Midlands

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Introduction

In Britain, projected population rise and climate change threaten future water availability. UK water companies run education programmes to encourage more efficient usage, but these tend to focus on primary schools and adults, missing the opportunity to engage secondary school pupils as the next generation of homeowners and bill payers. Educational interventions also traditionally follow the theory of rational choice, envisaging learners as able to change their attitudes and behaviours in accordance with newly acquired information. Sociological research on social practices and ordinary consumption, however, sees water as playing an inconspicuous role in daily domestic activities. Technological infrastructure and prevalent social norms mould behaviour and limit the ability of water users to alter their consumption.

This interdisciplinary thesis attempted to break the impasse between works from educational and sociological perspectives, using the theoretical lens of water citizenship. A review of current water education provision in the East Midlands region was undertaken, and a school-based study involving questionnaires, focus groups and exploratory lessons around water. For the school-based study, I engaged three secondary schools in the East Midlands region, here given the pseudonyms Alfon School, Braveley School and Chalksmere College. I worked with one class of Year 7 pupils at Alfon School (age 11-12), two classes of Year 9 students at Braveley School (age 13-14) and four classes of Year 12 students at Chalksmere College (age 16-18). Focus groups were held with 4-8 students from each school. A questionnaire was distributed and a focus group held before a set of water literacy lessons, and a second questionnaire and focus group were conducted afterwards. This process was repeated for all three schools.

Aim and Research Questions

The aim of this thesis was ***to explore the impact of initiatives for water literacy on the water citizenship of young people, specifically secondary school students.***

The specific research questions were:

1. How, and how well, do education materials currently encountered by young people in the East Midlands work with respect to making water use visible?

> This question was addressed by considering the presence of water in education resources for secondary school-aged children, with a focus on non-formal providers such as Severn Trent Water, Action Aid and the Geographical Association.

2. What is the current state of water literacy amongst young people in the East Midlands?

> This question was addressed through questionnaires and focus groups with secondary school students, in order to determine the understanding and conceptions young people have about their own water use and resources more generally.

3. What are the social influences on water values, attitudes and behaviours, and how do these affect the development of both water literacy and water citizenship?

> This question was addressed through exploration of the reasons why traditional education might not be able to tackle unsustainable water behaviours, considering the composition of 'everyday' water use as consisting of habits, routines and lifestyles, and being influenced by social norms, peers and family members, as well as technology and infrastructure.

4. What are the wider insights that can be gained concerning the role of water literacy initiatives in increasing young people's water citizenship?

> This question was addressed through exploring how effective educational experiences for water literacy might be in stimulating a sense of water citizenship. This was done through developing a set of resources to trial in secondary school geography lessons.

Key Themes and Arguments

Nested and connected scales in water education materials

- I argue for the use of nested and connected scales in water education materials to develop a sense of responsibility towards water used in different localities. I note the absence of attention to 'the local' as a scale in existing water education materials, which misses the opportunity to help people feel a greater sense of personal connection to their area. Where materials fail to make issues personally relevant, for example through discussing personal water use, virtual water or tourism, there is a risk that personal efficacy will decrease and apathy will take hold. I also draw attention to the 'missing scales' which could help to clarify links between personal water use and the global problem of water scarcity.

- It emerged that the young people I spoke to did not feel they had a great deal of control over their water consumption and many felt little personal responsibility to act. This means that education materials need not only to pay attention to the agency and responsibility of young people, but also to strive to increase this where necessary. The commonly utilised 'water saving tips' tend to link to small actions, failing to provide background information on *why* an individual should act, and *what* the wider impact of changes in their personal behaviours and actions would be.

- In addition, I argue for the importance of a futures dimension to education materials in order to encourage a sense of intergenerational citizenship (Hicks, 2008, Dobson, 2007), but noted difficulties in maintaining care over long distances and timescales, as was previously identified by Barnett and Land (2007).

Responsibility

- I argue that it seemed young people do not feel a great deal of responsibility to act and give little thought to their water use as a result, which reflects the body of literature on the sociology of ordinary consumption (Shove and Warde, 1998, Gram-Hanssen, 2005). I noted feelings of personal inefficacy amongst many of the students, reflecting the results of previous studies in revealing young people's feelings of disempowerment. However, feelings of personal inefficacy are likely to stem not only from the scale of the issue (resulting in Connell et al.'s (1999: 101) "action paralysis"), but additionally from the smaller range of water-using activities that teenagers engage in inside the home, and therefore relate to the limited power young people have to change routines at home. This can also connect to feelings of inefficacy resulting from the inaction of other family members.

- A key finding was that while many students described making a 'reasonable effort' towards water conservation, akin to 'doing their bit', a strong contingent outlined their

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special efforts to act sustainably, making clear that this is not yet something that has become normal behaviour. This is an important finding which suggests making water conservation the 'norm' could work for a proportion of students, but as others seemed to enjoy setting themselves apart from the norm, a strategy tailored to these pupils is also important. This finding also highlights the potential for efforts to make water use visible to have a real impact.

(In)visibility of water use

- Water emerges as largely invisible in its consumption at the household scale. A disconnect was noted between conceptions of water use at the household scale, and water availability nationally and in other countries, demonstrating the often inactive and subconscious consumption of a resource which bears little relation to water in the landscape once it enters the home, in what Bakker (2003: 49) terms the "hydrosocial cycle".

- Knowing how many litres of water the average person in the UK uses each day appeared to become more common with rising age (the Alfon School pupils were least likely to know this, while the Chalksmere College students were most likely). Indeed, the older students were also probably more capable of comprehending and visualising this figure, though this may even be challenging for adults.

Special efforts and trade-offs

- I consider how young people's norms of water use are constructed and the extent to which individuals wish either to act 'normally' or to act in ways that distinguish them from peers. In exploring the gap between general water and environmental attitudes and the behaviours undertaken, I argue that some environmental actions could be 'traded off' against each other, with individuals potentially selecting actions perceived as 'easier' - like recycling being performed preferentially (partly due to its promotion and the availability of infrastructure) and used as an excuse for failing to take actions perceived to be more difficult, such as saving water. This relates to the concept of negative spillover described by Thøgerson and Ölander (2003) and others, and it was more noticeable than positive spillover resulting from catalyst behaviours in the manner suggested by Defra's (2008) research.

- Recycling could be seen to have shifted into the realm of normal behaviour, whereas many other pro-environmental actions have not. However, a strong contingent described the 'special effort' they were making either towards water conservation or pro-environmental actions more generally, which certainly should not be ignored, and suggests the idea of subconsciously nudging young people towards sustainable water behaviour might not be universally successful.

Influence of, and on, parents

- There was some evidence that financial motivations affect young people's behaviour, even though they are not responsible for paying domestic water and energy bills. I suggest that parental attitudes and priorities, such as saving money or time, do influence the sustainability of the habits of their children. The young people were happy to admit that they forget to behave in a water efficient way at home and see this as a reason in itself for doing so.

- There are limits to the influence and, hence difference, children can make at home. Some of the participants in the focus groups recognised this, acknowledging that their parents led busy lives and may not be able to take time out to support them in taking on more sustainable behaviours.

- I consider the social communities to which a young person belongs and how they may have to manage conflicting norms between their peers, parents and teachers. The ideas which they come to school with - Thomson's (2002) 'virtual school bags' - influence how pupils interpret the messages they receive; a process that will be reconsidered as and when they are away from class and are more receptive to their peers' and parents' opinions. Young people may be reluctant to admit the influence their family has on their actions, despite some describing being 'nagged' to conserve water.

Social norms of hygiene and cleanliness

- Some water conserving behaviours were perceived as unhygienic or dirty, and indeed at Braveley School the focus group participants vocally objected to one student's suggestion of saving water by not always flushing the toilet. I explored the way in which water is used in public and private realms and its subsequent susceptibility to social and subjective norms. This is particularly pertinent to the teenage age group, as the participants were at a stage where hygiene is becoming increasingly important to them. I considered the difficulty in starting conversations about water efficiency whilst still promoting hygienic and healthy living to teenagers, and suggest that water conservation education is also difficult to fit with the requirements of Personal, Social and Health Education (although some aspects of it may fit more appropriately in PSHE classes than in geography).

- One barrier to a shift towards seeing water conservation as a 'normal' or a chosen environmental behaviour could be pupils' perceptions of it as 'dirty' or as resulting in reduced standards of personal hygiene. In this context, many of the young people surveyed understood perfectly well that they were not acting as sustainably as they could in terms of water use, but were quite willing to accept that behaviour.

Ability to act

- I note an increase in basic factual knowledge after the water education sessions had finished at Alfon and Braveley Schools, where most students seemed to feel more knowledgeable about water. This increase was statistically significant at Alfon School. There was no significant difference in perceived ease to reduce water consumption at home, but amongst Chalksmere College students the perceived influence of the family increased. More positively, feelings of personal responsibility towards future water availability increased significantly at Alfon School.

- Specific behaviour changes were questioned at Chalksmere College (although it was not envisaged that a short educational programme would have changed behaviours significantly). Small changes in responses could be detected though these were not statistically significant. This could indicate marginally better awareness of behaviour and perhaps a first step on the path to more water efficient behaviours, influenced by increased water literacy and citizenship and water use at home becoming more visible. However, results would need to be verified with a longer-term study.

Impact of knowledge increase

- Interestingly, the vast majority of the students were unaware that their opinions had changed in the second questionnaire. In particular, I noted a large discrepancy in the percentage recognising that their perceived behavioural control had changed (in terms of ability to save water at home). Half of the youngest students thought the lessons had changed the way they use water, but only a third of oldest students. Amongst the oldest students, who gave the most detailed responses, knowledge was perceived as the key driver of change in behaviours for those who said their behaviours had changed, but those who did not think their actions had changed predominantly referred to already having sustainable behaviours as their reason for not acting differently. For these students to change their actions, education would need to encourage them to recognise where they might still be wasting water, for example by carrying out a water audit.

- I note that the focus groups themselves will have had an impact on attitudes: perhaps, as a stand out 'special visit', they could have had more of a lasting impact than normal lessons would have done. There is potential for co-production of knowledge to take place in focus groups, though this may be more appropriate when working with groups of adults, rather than school pupils who are expecting to learn pieces of information applicable to their examinations.

Water literacy education in action

- Some students wanted water education that applied more to their personal behaviours, which could be beneficial for behaviour change but is unlikely to be a feasible option in school lessons, particularly at A-level where there is pressure to prepare for examinations. I also noted that integrating education for water literacy into geography lessons is difficult, and becomes even more so after Key Stage 3. However, a case can certainly be made for making water education relevant to young people and the behavioural changes they are capable of making. As mentioned earlier, there may be potential for water literacy initiatives to be taken up by PSHE lessons in the context of conserving water whilst still remaining clean and healthy, or for water citizenship to become a whole or cross curricular topic.

In sum, water literacy education was demonstrated to have an impact on young people's water values, though the effect differed widely between schools and individuals. It is unlikely that behaviours were changed simply as a result of the lessons but acknowledgement of actions seemed to have increased, which is a positive result. The most promising outcome was an increase in sense of responsibility, though a decrease in perceived behavioural control was a cause for concern.

Overall Conclusions to Thesis

The main conclusion to the thesis is the idea that effective educational initiatives for water literacy should make water use 'visible' across spatial scales.

The first element of this is 'visibility' of water, which comes about through conversations about water use: finding out the ways in which it subconsciously enables everyday domestic activities for cleanliness, hygiene, relaxation and food preparation, where water is rarely if ever 'used' for its own means. The ways in which these activities come together to form daily habits, routines and lifestyles mean that water as an element becomes increasingly hidden. Making water use at home more visible through water lessons could develop a young person's sense of ability to act. Deconstructing the routines, habits and lifestyles in which water plays a part, and the influences of peers, family and social norms on water use, help to bring water consumption into the foreground, and hence easier to make more sustainable.

Knowledge about the volume of water used for these actions and habits- and what a figure in litres actually means- is also important, and it should not be assumed that young people (or even adults) are able to visualise and comprehend what a number of litres looks like, whether those litres of water are being used to flush a toilet, or enable the production of the ingredients of a packed lunch. Conversations about water use bring it to the forefront of young people's

minds, and perhaps increase the possibility of water conserving behaviours being considered "normal" in the future, in the way that recycling behaviours appear to be with the teenage generation. A high proportion of domestic water use takes place behind the bathroom door, and enabling conversations about water use in this realm increases its 'visibility' and active thought; however, it is questionable whether a school lesson is the appropriate place for these conversations. Ways of bringing water into conversations increases the conspicuousness of water consumption, enabling people who may already have water conserving values (or who have developed these through education programmes) to put these values into practice, if they so desire.

The second element of the overall conclusion to the thesis is for water use to be made visible *across spatial scales*. Water literacy initiatives can enable young people to understand the ways in which water operates as a global resource; linking a young person's personal actions to their local environment, the state of water resources in their region or country, and the impacts they might actually be having on water availability in other countries. Starting with personal actions utilises a constructivist pedagogical approach by moving from the known to the unknown, enabling connections to be made by pupils, and making sure concepts do not come across as abstract. This, in turn, could help foster development of a sense of water citizenship and responsibility. Water issues are less likely to be thought of as "not affecting me" when concepts such as virtual water are understood.

Implications of the research for practice

Greater understanding of the composition of young people's water use at home can help inform an innovative education programme which works to increase the visibility of water at home, and explicitly link personal water use to local, national and global scales, which subsequently should not only increase young people's sense of responsibility towards water but help them to identify how they could take action. Connections between past, present, possible and probable futures should also be made. While social practices and education researchers come at natural resource use from very different angles, there is potential to utilise insights from a range of literatures to make water use more visible and recognisable.

To take these findings forward, I suggest that the dearth of personal responsibility detected amongst students, despite a generally positive environmental or water conservation attitude, relates in part to the invisibility of water in everyday use, and a lack of connection between the personal and the global scale in education materials. Where lessons attempted to link scales using concepts such as virtual water, sense of personal responsibility increased in the second questionnaire. Elements of a futures dimension in lessons may have also contributed to this increase, and both of these components could be developed further in future lesson plans.

The divide in student opinion on personal water actions, with many citing themselves as making a 'reasonable effort' but not a 'special effort', or 'doing their bit', has been previously cited in the literature (e.g. Owen et al.'s (2009: 29) "good behaviours") and is perhaps more liable to negative spillover rather than the positive spillover that might be expected. This group of individuals would be best targeted with demonstrating sustainable norms of behaviour, which is a dominant strategy in water and environmental social marketing and education. Conversely, the small contingent of respondents who were keen to set themselves apart from the norm and demonstrate the extra effort they are making may not currently be being targeted by educational materials (perhaps because arguably they don't need to be) but should certainly not be ignored. I also wish to note the challenges to working in the classroom, which include: limitations on what can be achieved in a lesson (including a heavy focus on preparation for national examinations from age 15 onwards); the legitimacy of potentially teaching about behaviour change (bearing in mind Standish's (2009) argument that uncritical pro-environmental teaching could be 'greenwashing'); and the potential for longer term changes that could not be tested in practice.

The thesis argues for the careful planning of education for water literacy in order to avoid decreasing perceived behavioural control and self-efficacy amongst young people. This includes a shift away from the message of 'doing your bit' for water conservation and instead recognising and harnessing the desire of some young people to set themselves apart from the norm. Otherwise, as has been demonstrated, water education could act to decrease perceived behavioural control and self-efficacy. Possibly, this can be avoided through collaboration with parents.

While water saving tips certainly have a role to play in water education, I would recommend more focus on building deep understanding about water issues and tailoring behaviour changes to what a young person would be capable of and also motivated to do. The focus group with students from Alfon School highlighted less obvious household water uses like sterilising dummies, water fights and cleaning out fish tanks. There could be potential for devising engaging water education programmes which reference less obvious uses like these and how they could be carried out more sustainably. Knowledge and understanding at a deep level at least gives young people evidence to inform potential behaviour changes.

While the benefits of education for water literacy can align with the aims of geography curricula, the case for behaviour change to be taught in the classroom is less clear. This highlights a potential role for water companies and charities, as opposed to formal education providers, although the priorities and agendas of these organisations should be borne in mind when using their materials. Furthermore, where specialist knowledge is required, sources of professional development for newly qualified and non-specialist teachers may be necessary, whether this is through formal or non-formal channels.

Towards a future research agenda

It is clear firstly that benefit could be gained from repeating the study on a larger scale to obtain a greater amount of comparable quantitative data. Engaging a larger number of schools, with comparable age groups, would provide a more reliable data set on young people's water values, attitudes and behaviours in the UK, for which there is currently little data. This could be made even more beneficial through a longer term study, with a second follow-up session six months after the first, for instance. In addition, there is an opportunity to collect more in-depth quantitative and qualitative data on behaviours, asking a greater number and range of young people about their water behaviours before and after education, while also providing more open-ended questions. However there remain possible issues related to this type of study in terms of self-reported behaviours and a desire to give the 'right' answers. Indeed, due to the time restraints in carrying out the data collection, it was not possible to utilise all the findings from the questionnaires and focus groups in designing the water lessons. There is now an opportunity to design water literacy education programmes in accordance with my findings, attempting to develop responsibility, empowerment and self-efficacy, whilst building a concrete knowledge base on water issues from the personal to the global scale, and making water use visible.

Finally, a research question that emerged during the course of my research is whether parents recognise their influence on their teenage children's water usage and vice versa. It would be interesting to collaborate with parents in corroborating information provided on water habits and behaviour changes, and this would decrease the problems associated with self-reported data. Steps could also be taken to overcome adolescents' perceived limited ability to act on water consumption at home if parents were engaged in the research.

This study has established that education for water literacy can play a role in making water use more visible at a range of connected scales from the personal to the global. I therefore suggest that further research should be pursued in three main strands:

1. A longer term, larger dataset study to build our understanding of young people's water literacy and water citizenship at present;

2. Creating, testing and finalising education packages for water literacy and water citizenship, focused on tackling the 'invisibility' of water from personal use up to the global scale;

3. A more integrated approach utilising family and household units to explore the dynamics of water use in the household, and how young people's school education influences and is influenced by household practices.

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