Engaging Young People in the Circular Plastics Economy using Citizen Inquiry Methodologies and Creative Participatory Research Methods

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This paper describes a multi-disciplinary research project which explored the use of various creative participatory research methodologies including Citizen Inquiry to identify what young people really understand about and how they relate to the circular plastics economy. Within the scope of creative participatory research that the project espouses, the paper outlines a novel exploration of how Citizen Inquiry methodology can be used to engage and amplify the voice and actions of young people and work to foster genuine environmental agency amongst the young people who took part. The ensuing project also had an explicit international dimension that provided a comparison between youth-centred circular plastics economy related initiatives in two European cities (Hull, UK and Bremerhaven,Germany)

Introduction

Plastic waste has reached the 'alarmed discovery and euphoric enthusiasm' stage of 1. Down's (1972) 'issue-attention cycle' that predicts such positivity will quickly evaporate as the public realise the sacrifices required to resolve environmental issues of this nature. One proven strategy for avoiding this public lethargy is to engage people at a local level on projects where they can make a real difference and help keep issues high on the public policy agenda. One obvious example is environmental issues, and Citizen Inquiry, the focus of this project, is a novel methodology by which to engage the public in matters of genuine and personal interest to them.

'Citizen Inquiry' describes how members of the public can learn by initiating or joining their own inquiry-led scientific investigations such as identifying sites of 'fly tipping' or undertaking water purity sampling in a local reservoir (2. Sharples et al. 2013). The transdisciplinary project described in this paper brought together researchers from three different areas in the University of Hull (Education, Politics and Chemistry), along with external stakeholders such as community-based youth projects, schools and specialist education providers. The project was supported through internal pump-priming funds distributed as part of an Evolving a Circular Plastics Economy (ECPE) grant awarded through the Engineering and Physical Sciences Research Council (ESPRC). This paper focuses primarily on the way in which young people, in a variety of formal and informal education settings, engaged with Citizen Inquiry research activities and how this engagement impacted on their motivation, attitude and participation towards the circular plastics economy.

The paper includes findings from a comparator case study with young people in Bremerhaven, Germany, a city of comparable size and economical and environmental challenges to Hull, in order to initiate a wider understanding of the issues involved in engaging young people across different settings and cultural contexts. Hull and Bremerhaven have been chosen as case study cities for this project because they are both under-researched, medium-sized coastal cities with similar structural disadvantages including low educational attainment and high youth unemployment. Much of the existing research on local environmental initiatives has focused either on large cities such as London (UK) and Berlin (German) or on affluent medium-sized cities such as Bristol (UK) and Freiburg (Germany) the latter of which have played leading roles in European and/or global environmental city networks. Structurally disadvantaged medium-sized cities, which have remained under-researched, often lack the resources to get involved in such networks. However, emerging recent research on climate change innovations (3. Wurzel et al. 2019) has shown that structurally disadvantaged cities such as Hull and Bremerhaven have pioneered environmental innovations which have often been driven by local citizens including young people. Bremerhaven, in particular, exemplifies this assertion through its establishment of a Youth Climate Council (Jugendklimarat) and Hull demonstrates a strong commitment to issues affecting the environment through its Youth Parliament.

The paper also discusses and presents examples of an especially notable aspect of this project whereby several of the case study groups followed an impetus to influence and impact upon the environmental efficacy of children much younger than themselves through the design and co-creation of educational digital media platforms. An animated film, a digital game and two downloadable 'apps' were created during the course of the project which, their

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creators intended, would have the capacity to influence and educate those younger than themselves (typically primary school children) in the circular plastics economy.

Background to project

The Evolving a Circular Plastics Economy (ECPE) programme under which this project was funded, was an Engineering and Physical Sciences Research Council (ESPRC) funded programme awarded to a multidisciplinary team at the University of Hull led by academics in Chemistry and Geography. Using this funding, the university established the *Plastics Collaboratory*, a diverse group of researchers from various disciplines such as chemistry, geography, logistics, education and politics. The Collaboratory aims to understand the pathways and interactions of plastics in the environment, identify the gaps and leaks in a circular plastics economy, and explore and develop new pathways to an enhanced circularity in plastics use. The current project, referred to as 'The Plastic Citizen project' was just one of the several projects, within the Plastics Collaboratory, with the overall aim of tackling some of the key issues and challenges around the problems caused to the environment by excessive use and disposal of single-use plastic. The Plastic Citizen project aims to do this through examining the attitudes and approaches of young people to the issues relating to the circular plastics economy and by empowering them to undertake and share their own research using Citizen Inquiry methodologies.

Research Design

The overall objectives of the project were to:

- identify what young people know and understand about the circular economy
- work with EPCE scientists to develop a student friendly typology of plastic types for use in a Citizen Inquiry investigation
- test the feasibility of Citizen Inquiry methodologies in primary school age settings
- explore how young people centred initiatives (e.g. youth councils) can influence decision-making and increase their sense of environmental agency
- develop an international youth perspective on issues like the plastics circular economy to prepare future European funding applications around Citizen Inquiry
- create teaching resources to support the wider understanding of the plastic circular economy with different groups and students

These objectives were underpinned by the following research questions:

- What forms of public engagement about plastics related initiatives are young people currently undertaking in Hull and similar/contrasting settings (e.g. Bremerhaven)?
- How do Citizen Inquiry methodologies and other young citizen centred activities engage young people in the circular economy and the reduction of plastic waste?
- What can cities like Hull and Bremerhaven learn from each other about plastics related initiatives for and/or by young people?

With the project aim of engaging young people in the circular plastics economy, the University of Hull School of Education employed a post-doctoral research assistant (PDRA) with specific research experience in working with children and young people, particularly in utilising creative participatory research methods in researching the lived experiences of young people with a focus on the intrinsic commitment and understanding of the concept of voice (4. Cahill, 2007). Henceforth, the research was designed in order to create opportunities to acknowledge that voice, in terms of fostering each young participant's ability to express their thoughts and feelings relating to the issue of single-use plastics and also, importantly, to be encouraged to justify and back up any anticipated calls to action. To achieve this, it was important from the outset to acknowledge that facilitating the production of that voice is an interpretive process and involves an interaction between the researcher and the researched (5. Silverman, 2001; 6. Clough and Nutbrown, 2003). To this end, the PDRA employed was experienced both in designing research methods based around extracting and releasing the voices of the young participants, and was also a qualified youth worker who had worked with many youth based projects and schools in the region, a factor which served as an advantage in that the project already had access to a wide network of young people engaged with formal and informal education providers in the local area. The PDRA was supported by another researcher whose role was to observe the participatory research processes as facilitated by the PDRA and to initiate the development of a case study approach to focus on the specific activities emerging from each of the six settings which the project engaged with.

In terms of the project's approach to establishing itself as an attractive opportunity for young people to participate in, it was decided in the research design stage to address the language the team would use when discussing the issues relating to single-use plastics with young people. When we refer to the circular plastics economy, we are often using terminology born from scientific and academic roots rather than that which young people have identified and relate to. The research team aimed from the onset therefore, to explore the language that young people were using themselves around the plastics agenda through searching for the most used terms on online forums and social media. It was found that young people appeared to use the phrase 'single-use plastic' when relating to the reusing and recycling of plastics and no evidence was found to show that the 'circular plastics economy' was referred to at all by young people. The researchers involved in the project therefore refrained from using this term 'circular plastics economy' particularly in their initial introductory discussions with young people, and instead 'single-use plastics' was used as the topic with which to frame the research. In the process of observing social media sites and initiatives which involved young people, all had visible and eye-catching logos, hence the decision was made to 'brand' the project

with the title 'Plastic Citizen' along with a simple logo in order that it could be easily recognisable and relatable to by young people (see Figure 1 below)

Figure 1: Plastic Citizen logo

A website (www.plasticsinquiry.com) was created in order to document the research carried out by the various youth groups along with a Twitter and Facebook account.

It is important to note that participatory research is "not a theory but an approach to praxis that uses any and all tools that co-researchers find helpful" (7. Greenwood and Levin, 1998, p.181). Participatory methods with children and young people, whereby the participants help design the research processes fosters the construction of methodologies that are more sensitive to how children view the problem, in this case, the problem of single-use plastics. Genuine interest to participate without manipulation was a critical factor that the researchers were mindful of throughout the project. The project design aimed to be empowering and potentially transformative, with a carefully considered exit strategy in the form of a competition for the 'best' (judged on a set of criteria pre-set in the research design phase) project that contributed to the circular plastics economy. As the main target groups for participation were predominantly under 16 years, the research team were careful to remain cognisant of the inherent power imbalances already existing between adults and young people. One of the objectives was to become aware of the meanings given by young people to the topic of single-use plastics, so it was important to be reflexive regarding how adult conceptions of the issue shaped those of children. The way young people's self-concepts may be changed and their conception of and interaction with their communities needed to be considered carefully throughout.

Informed consent was sought from the young people involved along with their parents/legal guardians and the Group Leader (head teacher or youth worker/leader) three weeks prior to commencement of fieldwork. A blanket consent form for young people's active participation in the project's design was issued, along with a clear and concise information sheet reflecting the activities occurring in the preliminary stages (participatory research activities such as idea-generation, photo-elicitation). Later on, as activities specific to each group/individual became confirmed, further consent was sought as required for the young person's participation in each activity. Any aspects of the research which potentially made an individual (as opposed to a group) easily identifiable (e.g. a drawing or video) would be anonymised in any subsequent reporting and writing-up of the research.

A significant ethical issue concerned gaining young people's 'assent'. Following parental/legal guardian informed consent, it was built into the research design that young people will denote assent in age-appropriate ways (e.g. through symbols, or cards with the options 'yes' or 'no'). Care would be taken to ensure young people would not be made to feel conspicuous due to their choices. In the interests of inclusion, it was intended that any young people whose parents had not provided consent would still be allowed to be involved, but no data would be used relating to that young person individually. As the project rolled out, it transpired that none of the above issues were pertinent as all young people gave their assent to be involved in the project through a simple yes/no response and there were no objections raised by parents in terms of restricting their child's involvement.

The project was split into three phases, it started by exploring the 'voice' of different youth groups to identify what they understand about issues related to single-use plastics and how they believe they can influence and impact upon it. This information was then used, as outlined above, to develop a participatory research design which included young people as co-researchers in designing their own individual projects aimed at engaging them in the circular plastics economy based on the following guidelines:

The projects designed by the young people were to:

- Encourage others to use at least one of the 4 Rs: Re-purpose; Reduce, Re-use and Recycle single-use plastic.
- Involve carrying out research – may be with other young people, may be local community, school etc.
- Involve digital technology in their design/execution.

The intention was that each of the six groups of young people that the project engaged would work either individually, in small groups or as a whole group together to design a project which would influence the circular plastics economy through tackling the problem of single use plastic utilising the 4Rs as outlined above. It was originally intended that the designs would be entered into a 'Dragon's Den' type event at the university in June 2020 whereby the young people would present their ideas and potentially win a prize for their youth project/school. Unfortunately, this event was cancelled due to the onset of the Covid-19 restrictions which were put in place in March 2020.

The Settings:

The project was undertaken across six different settings with various groups of young people as described below:

1. Year 5 primary school group (consisting of 38 mixed gender young people in Year 4 - aged 8-9, based in one primary school setting, this group engaged in 8 x weekly 2 hour sessions with the Plastic Citizen project)

2. International Pupil Council (consisting of 30 mixed gender young people in Year 5 - aged 9-10, these young people were from 15 different primary schools but came together as one group to participate in the project across 5 sessions)

3. Girl Guide group (consisting of 8 young females, aged between 11 and 15 who participated in 6 sessions with the Plastic Citizen project).

4. Environmental Youth Group (consisting of 9 mixed gender young people aged 11 – 16 who already met weekly to initiate environmental campaigns in their community and on a national level), this group participated in 8 x Plastic Citizen project sessions)

5. Alternative Education Provision (AEP) for young people with Social, Emotional and Behavioural Difficulties (SEBD) (consisting of 6 young people aged 11-14 who engaged in 6 sessions with the project researchers)

6. Youth Climate Council (An environmental activist group in Bremerhaven, Germany consisting of 14 young people aged 16 -18) and 3 x school groups (1 x primary and 2 x secondary) in Bremerhaven, Germany. (The research team included for this aspect of the project, a German speaking researcher who aided in translating the research tasks and activities.)

For each of the settings a similar format was adopted in that the researcher initially introduced the project through carrying out a series of icebreaker activities such as encouraging the whole group to stand in a circle and throwing a ball to each participant and asking each to think of an item of single use plastic when they receive the ball before passing on to another in the circle. This activity then developed into an activity called 'concentric circles' whereby the group splits in half, one half being 'speakers' and the other half 'listeners'. The speakers then move around the outside of the inner circle of 'listeners' and tell each of them a problem that can be caused by single-use plastics and then an idea that they have for solving that problem. The listener can then ask questions about the idea in order to refine it. The resulting ideas are then presented back to the whole group by the 'listeners'.

These are common activities synonymous to the participatory research methodology and can be adapted to explore any topic or questions that are pertinent to the research being undertaken. The activities also served to engage and relax the group and worked particularly well with young people as they were inclusive and could be adapted for any age range and ability. The next activity involved the researcher presenting an outline of what the project aimed to explore and then the context within which the project fit, this was done through talking through a Powerpoint presentation which included a short film about single use plastics. A group discussion was facilitated around identifying what the main issues relating to the use of single-use plastics was and then the Plastic Citizen competition project along with the associated guidelines was presented and the young people encouraged to work either together or individually to devise projects which would meet all of the guidelines as outlined above.

The international aspect of the project was provided by the various groups engaged in the project in Bremerhaven, Germany. The school groups consisted of 60 primary school pupils who participated in a 3 hour workshop with the Plastic Citizen project and then 2 classes of 24 secondary school students, each of whom participated in a 1.5 hour workshop with the project researchers. The Youth Climate Council participated in an informal discussion/focus group to discuss specifically how young people in Germany related and responded to the issue of single-use plastics. The subject related to their own formation and how they linked in with local governance and decision-making processes related to local and national environmental concerns. The results will be published in a forthcoming paper related to these issues and findings.

The Plastic Citizen project was notable in that it adopted the novel approach of facilitating a Citizen Inquiry 'mission' with one of the groups of young people, the International Pupil Council (IPC). This involved supporting them to co-design their own Citizen Inquiry research project based on addressing issues relating to the circular plastics economy and related environmental concerns. Traditionally, Citizen Science initiatives have typically engaged a demographic of white, middle aged, middle class men (8. Herodotou et al. 2018) who already present a considerable knowledge and confidence in their approach to engaging with scientific concepts and issues. Citizen Inquiry is a methodological approach born of the intersection between Citizen Science and Inquiry-based learning and aims to broaden this demographic typicality by enabling Citizen Science to transcend boundaries, not only social (age, class, ethnicity) but also academic, through facilitating a cross-discipline approach. Websites such as Zooniverse.com perfectly illustrate this approach through presenting Citizen Science style investigations in fields such as literature, botany and even the social sciences. It is this foray into adapting Citizen Science type research for social science investigations - in this case, the engagement of young people in the circular plastic economy that this aspect of the research linked.

Research Outputs and Outcomes

In terms of research outcomes and outputs, the project has elicited six case studies based on the participation of each of the projects as outlined above. These case studies have led to the emergence of a number of key findings which are outlined individually in the discussion section below. At least two academic articles are currently in the process of being submitted to relevant international and interdisciplinary journals, one is based on young people's perceptions and factors relating to their engagement with the circular plastics economy and the other on the impact of utilising Citizen Inquiry methodology based on the pilot with the International Pupil Council as outlined in the Research Design section above.

Other notable outputs have been the creation of two user-designed digital 'apps' to engage and educate primary school children in activities relating to the 4R's. The young people involved in the various projects have also produced a number of learning resources, again, designed to be used with younger children. These include a set of jigsaws based around the 4Rs; a series of posters to be displayed in schools/youth settings to encourage young people to recycle their plastics; designs for recycling bins to be installed in a school dining hall for children to recycle any single use plastics in their packed lunch boxes; planters made out of recycled plastic to be installed in a school playground for growing edible produce; a story book, aimed at younger children containing fun facts about how children can contribute towards a circular economy and an animated film made with a local arts production company which will be available on YouTube and will also be linked to supporting activities and resources on the project website.

The young people who initiated the Citizen Inquiry project utilised the Open University's nquire platform to create an online inquiry into the recycling habits and attitudes of their local residents. They then presented the results of their survey along with a report based on their ensuing analysis of findings to the Lord Mayor of Hull. Another group instigated a piece of research with over 100 other young people which was presented at the local Youth Parliament. They also facilitated a plastics sorting activity at the same event whereby they presented a selection of single use plastics for other young people to sort and classify according to the type of plastic it was. Several of the projects included aspects of creating prototype apps to identify the seven main different types of plastic in order that the subsequent collection and processing of post-consumer waste can be greatly simplified. The young people anticipate that their apps will enable consumers to distinguish between the different types of plastics and recycle accordingly.

Other outputs included teaching resources developed by the research team in order to facilitate the ongoing engagement of the young people in the project upon the onset of the Covid-19 pandemic. These resources were made available to the young people via email to each project group leader/teacher and also housed on the project website. Other communication methods were facilitated in order to maintain the momentum of the project including meeting through online conference platforms such as Zoom. In order to best safeguard the young participants in these online endeavours, the team created a digital safeguarding protocol which outlined the protective measures to be put in place for any online activity such as the use of an online waiting room in order to approve all participants before accepting into the meeting and password protection for video conferences.

Discussion

Each of the six case studies showed that although the same or similar engagement and research methods were used for all of the projects, there was a notable disparity in the overall response to the project across the different settings. This appeared to be mainly influenced by whether the young people engaged through a mainstream schooling session or a more informal education setting such as that relating to a youth group. Those young people engaged through a school setting appeared to require more structure in terms of preparing resources (such as drawing templates, Powerpoint presentation and worksheets) whereas the informal settings, such as youth groups which were not linked to a school appeared to respond to less structure and also showed a much higher level of autonomy and self-direction in response to the project brief.

A positive aspect of the participatory research methodology was the ability for the specific activities designed by the research team to quickly engage young people fully in the research. An example of where this worked particularly well was through the use of the icebreaking activities, which effectively enabled the young people to explore their current knowledge of the circular plastics economy whilst providing an indication to the research team of the level of this current knowledge. The icebreakers worked equally well with both primary and secondary school age groups, illustrating their adaptability in terms of utilising research methods which are flexible and responsive to the age and ability for young people participating. They also worked well when delivered with the school groups in Germany, a factor which illustrates the inclusive nature of participatory research methodology.

Whilst the young people demonstrated and repeatedly voiced their deep concern about the impact humans are having on the planet, they also indicated that they never or rarely heard about issues relating to sustainability or climate change in the classroom – this was particularly pertinent to those in secondary education. However, despite a lack of formal education on the issue, the research did show that young climate change activists like Greta Thunberg are inspiring young people to take matters into their own hands (9. Burns, 2020). The young people in the study indicated that their information and education about issues relating to climate change and plastic pollution tended to be gleaned from online sources and television programmes such as the BBC production David Attenborough's Blue Planet.

The research showed that almost all of the young people who participated in the project felt they demonstrated increased awareness about issues relating to the circular plastics economy, though their concerns were focused mainly on the impact that they could have on the recycling aspect. Promoting sustainability at home emerged as an important focus, with the majority of young people saying that they would try harder to recycle and also would be encouraging their parents to recycle. The young people described events whereby they had used their increased knowledge about the different types of plastics and their recycling capabilities to influence their parents buying choices when out shopping with them. They also said that through their involvement in the project, they tried to use products that are ethically made and are not harmful to the environment or society, however, several young people identified that this was very difficult for them as they did not have financial control over the buying choices within their family, therefore, their ability to shop more responsibly depended on the level of influence that they could engender over their parents.

Conclusions

This project has shown that the use of participatory research methodology, particularly Citizen Inquiry has established a way forward for making a significant contribution to tackling the key problems in the circular plastics economy. One of these is the ability for consumers to be able to distinguish and separate different types of plastics, including recyclable, non-recyclable, biodegradable and compostable. The young people in the project responded to this need by creating a variety of digital learning resources and teaching/learning activities for other young people to engage with. The revealing of young people's impulse to adopt the role of educators of children younger than themselves has been another important aspect of this research in that young people have intentionally positioned themselves in a peer education role, studies about the effectiveness of which have remained largely unpublished (10. Backett-Milburn and Wilson, 2000). 11. Heron (1996) suggests that participatory research co-created with others, repositions the participants (in this case young people) as researchers rather than those being researched. This has been exemplified in this project through this aspect of young people carrying out research 'for' other young people rather than just 'by' young people. Only by shifting the practice of researching 'on young people' to 'with young people' can we hope to facilitate research which is empowering, emancipatory and effects real change in the lives of young people.

The majority of young people feel their generation is under pressure to solve environmental issues such as climate change and plastic pollution but do not think they are well-enough equipped to make a difference (12. Young, 2019). This project moves some way towards resolving this issue through placing young people at the forefront of identifying, researching and developing collaborative approaches to teaching and learning resource deficits through the co-creation of a needs-led, responsive Citizen Inquiry led solution.

Conflicts of interest

There are no conflicts to declare**.**

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