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### Learning to be a smart citizen

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**Learning to be a smart citizen**

For Peer Review Only

## Abstract

The international Smart Cities movement (of cities driving digitally-led urban innovation) is not often linked with the international Learning Cities movement. However, there are learning questions at stake here. Smart City agendas are often criticised as being predominantly technocratic and instrumental, prioritising market-led solutions to urban issues (Cardullo and Kitchin, 2017). Such criticism has led, however, to recent moves to place the citizen at the centre of these discussions. This raises pedagogical and educational challenges: what theories and forms of learning are required for citizens to play a role in the development of increasingly digital, urban futures? To address this question, this paper adopts ethnographic methods to study the assumptions about learning and learning methods in a large, Europe-wide smart city project that aimed to include a component of citizen-led development.

Our argument provides important messages for policy makers, technology companies and Smart City planners keen to include citizens in smart city development. It suggests that the current ‘banking’ models of learning adopted in relation to citizen participation are not fit for purpose and that a new model is needed. This needs to recognise citizen learning as being situated in different social and material contexts and embedded in unequal relations of power, knowledge and resources. We make the case for Smart City initiatives to offer city inhabitants diverse experiences of technologies through critical, creative learning processes that value the different knowledge that communities bring and that begin to address some of the social, economic and technical inequalities that constitute the contemporary Smart city.

*Keywords: Smart City, citizen engagement, learning, digital literacies, creative citizen*

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## Biographical notes

## Introduction

A key feature of contemporary cities is their increasing digitization. This development of so called ‘Smart Cities’ in which digital services and tools are being implemented to foster a range of goals from more inclusive democratic dialogue to more efficient transportation poses pedagogic and educational challenges. What do citizens need to learn to be able to live well within and understand these environments as well as to shape their future development?

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3 This educational challenge is visible in urban theory literature which argues that there is a  
4 distinct mismatch between the rhetoric of the potential of Smart Cities worldwide to create more  
5 inclusive, democratic or more innovative cities and the actual practice of Smart City planning  
6 (Hambleton, 2014; McFarlane, 2011; Campbell, 2012; McFarlane and Söderström, 2017). In  
7 addition, whilst citizens are increasingly placed at the centre of Smart City visions problems with  
8 questions of governance, citizenship models and relationality of power have been noted  
9 (Hollands, 2015; Joss, Cook & Dayot, 2017; Gabrys 2014; Cardullo and Kitchin, 2018). Batty,  
10 for example, asks whether,  
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13  
14 Smart cities are equitable cities.... that... the sort of infrastructure, expertise and data  
15 that will characterise the smart city will enable equity to be easily established and such  
16 cities will improve the quality of urban life. (Batty et al, 2012 p. 516)  
17

18 This paper explores these challenges by putting educational theories into conversation with those  
19 of urban theorists. To do so, we study the models of learning that gain authority in one Smart  
20 City project and the emerging models of learning that might inform more equitable design of  
21 future, digital cities.  
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24 In the first section of the paper we explore two models of learning and how they emerge in the  
25 existing academic (and grey) literature relating to Smart Cities and digital learning in the city.  
26 We point out how they frame learning and learners in particular ways that have distinctive  
27 effects on participation and inclusion in conversations about digital, urban futures. In section 2  
28 we go on to introduce our research questions and discuss the ethnographic methods we used to  
29 explore how these models of learning circulated within one European Smart City project in the  
30 city of Bristol, UK. We suggest how ethnographic methods can enable scholars interested in the  
31 enactment of Smart City policies and practices to engage meaningfully with the diversity of  
32 actors involved. In Section 3 our findings explore how placing creative, collaborative models of  
33 learning at the heart of Smart City planning might enable more inclusive approaches to learning  
34 about and designing urban futures.  
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## 37 **Section 1: Two models of learning**

### 38 **The Banking Model**

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40 Current analyses of Smart City literature (Cowley, Joss & Dayot, 2018; Hambleton, 2014;  
41 Hollands, 2008; Nam & Pardo, 2011) suggest that learning in the city is framed in a narrowly  
42 instrumental manner. In this model citizens are offered a limited set of roles as service users or as  
43 enthusiastic entrepreneurs detached from place, context and everyday experiences.  
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46  
47 In Smart Cities literature, the citizen is often placed in a passive role, as a 'service user' where  
48 digital technologies are designed to improve the functioning of existing infrastructure and  
49 systems. Cowley, Joss & Dayot, (2018) have observed that the public here are assumed to be  
50 consumers rather than co-creators of services; that the new digital infrastructure is embedded and  
51 rendered invisible in the citizens' lives, and that processes of automation often render invisible  
52 opportunities for critical digital learning.  
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3 Hambleton (2014) further points out that there is an assumption that cities and their citizens must  
4 learn a universal set of skills as defined by city leaders and technology companies in order to  
5 participate in so-called inevitable ‘smart future’ visions. Dominant voices from the large  
6 technology companies, who have a vested interest in profit making in an ever-increasing market,  
7 are the source of these visions (Hambleton, 2014; Hollands, 2008; Nam & Pardo, 2011). Here  
8 citizens are challenged to adapt to and embrace new digital infrastructures as a necessary  
9 precursor to building more liveable, democratic and prosperous cities. This technologically-  
10 determinist approach places the technologies and their innovation as centre stage. Learning is  
11 understood as the development of a set of digital and business skills that might enable citizens to  
12 become more involved in entrepreneurial activity related to Smart Cities. Through hackathons  
13 (technology focused events, typically lasting several days, in which a large number of people  
14 meet to work together to solve a design problem) and other devices citizens are offered  
15 opportunities to create new services and products that might ‘plug into’ the Smart City (Cowley  
16 et al, 2018). The almost exclusively entrepreneurial outlook of these discourses can undermine  
17 more collaborative and consensus-building opportunities (Deakin and Al Waer, 2011) and tend  
18 to favour those with existing digital skills and expertise.  
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22  
23 In these visions, as Caprotti, Cowley, Flynn, Joss & Yu, (2016) suggest there is a focus on  
24 innovation and novelty as catalysts for change. Learning is therefore detached from context,  
25 effectively ignoring the social, historical, cultural and political dimensions of everyday urban  
26 life. This focus fails to engage with the situated nature of citizen participation and learning,  
27 which emerges from existing practices and experiences of and in the city (Hambleton, 2014;  
28 Cowley et al, 2018).  
29

30  
31 Indeed, reading these texts the dominance of what Freire called the ‘banking metaphor’ for  
32 education is clear (Freire, 1972). Here citizens are imagined as containers either waiting to be  
33 filled with the digital knowledge and skills necessary to engage in new, inevitable ‘smart’ futures  
34 or as nascent individual entrepreneurs needing to be taught to react quickly to new digital  
35 infrastructure. There is a paternalistic concern expressed for those ‘have-nots’ who are excluded  
36 from both access to and the ability to use digital technologies for their own purposes. Simplistic  
37 top-down educational responses are imagined as a way to respond to this. For instance,  
38 suggestions that tackling digital inclusion may be, ‘as simple as providing publicly accessible  
39 devices or launching a series of educational seminars for residents.’ (DXC. technology, 2016,  
40 blogpost).  
41  
42

### 43 **The Creative Citizens Model**

44 In 2016 we (names redacted) were brought into a major city-wide, project in Bristol in which the  
45 question of how to build the capacity of citizens to engage with Smart City developments was  
46 central. Our role was to ‘document and explore the role of citizens in co-designing digital futures’  
47 in the city. Located in a School of Education we came to the project with a very different set of  
48 assumptions from those outlined above, about both learning and how learning might play a role in  
49 citizens’ shaping of a city.  
50

51  
52 First: our assumption was that learners are active. Theories of critical digital literacies have long  
53 suggested that citizens should be considered active learners when engaging with new  
54 technological developments (Potter & McDougall, 2017; Eynon, 2015). Seeing the citizen as an  
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3 active learner places value on attending to how their diverse knowledges, creative approaches  
4 and critical social actions might contribute to positive future urban development. Here, learning  
5 can be understood as a tool to enable people to understand new and emerging digital  
6 technologies in order to change the Smart City, not adapt to it (McFarlane and Söderström,  
7 2017).  
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10 Second: we recognised literacy practices as being ideological not neutral. Current Smart City  
11 discourse presents the introduction of a particular set of digital literacy skills as an unalloyed  
12 good (Tapscott, 1998; Jenkins, 2007). The long history of literacy studies (Street, 2003),  
13 however, would suggest the importance of situating literacy practices in social, cultural and  
14 historical contexts, paying attention to relationships between literacy, power and knowledge and  
15 attending to the inequalities and knowledge hierarchies that these produce (Gee, 2000; Pahl and  
16 Rowsell, 2010; Buckingham, 2006; Selwyn and Facer, 2013). These literatures suggest that  
17 models of learning in Smart City projects must involve a deeper understanding of the already  
18 existing cultural knowledges and experiences of the city (Barton and Hamilton, 2012; Erstad &  
19 Sefton-Green, 2013).  
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22  
23 Third: As the digital increasingly becomes the ‘stuff’ of everyday life (Miller, 2010) the  
24 development of knowledge hierarchies becomes invisible, embedded in hidden infrastructures  
25 and algorithms that permeate the instrumentation of the city (Star, 1999). This perspective  
26 suggests that learning is distributed across digital and material spaces (MacFarlane, 2011). This  
27 requires us, as researchers, to consider that learning practices in the Smart City also include the  
28 material infrastructures being embedded to make smart cities work, the place-based memories  
29 held by the communities involved, and the new material goods such as electronic cars that  
30 suddenly appear on street corners.  
31  
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33 Our position on entering this Smart City project, then, was one that views learning as situated,  
34 ideological and material, drawing attention to why and how particular ideas about citizen  
35 learning become dominant over others and how these ideas might be questioned and reframed  
36 (Gee, 2000; Street, 2013). It sees the learner as creative, active and critical, as wanting (rather  
37 than needing) to learn certain things in relation to making urban futures. It recognises that, given  
38 the historical patterns of inequality that produce patterns of ownership, access and control of  
39 technologies, there are obstacles to city inhabitants finding routes to influence policy and  
40 technology shaping the development of the city.  
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## 44 **Section 2: Introducing the Mimeo Project & Research Aims**

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46 The Mimeo project took place in Bristol, a medium sized city in the UK. The city partnered with  
47 two other European cities to successfully bid for a large European Union Horizon 2020 project.  
48 The project lasts for 5 years (2016 – 2021) and is just entering its implementation phase as we  
49 write in 2018. The project is managed by the local municipality with around 16 partners  
50 including small and medium sized enterprises, community organisations as well as academic  
51 partners working on technology implementation and other evaluation.  
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3 The increasing focus on the need for citizens' involvement in Smart Cities is stated in the overall  
4 objective of the project:  
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7 To increase the quality of life for citizens across Europe by demonstrating the impact of  
8 innovative technologies used to co-create smart city services with citizens, and prove the  
9 optimal process for replicating successes within cities and across cities.  
10 (Mimeo Project documentation)  
11

12 The stated ambition of the project is that a 'co-creation' approach would enable innovative,  
13 replicable Smart City services to emerge in dialogue between citizens and project team that  
14 tackle familiar urban problems such as traffic congestion, poor air quality and unsustainable  
15 energy use. However, the project proposal documentation had no specific aims relating to citizen  
16 engagement or learning. Further, it is worth noting that while the development of technology  
17 accounts for half of the budget, citizen engagement in the process has just over 10% of the  
18 budget.  
19  
20

21 Bristol is known in the UK as a base for creative, digital business and arts practice. In addition, it  
22 has a strong voluntary and community sector involved in supporting citizen engagement and  
23 participation in decision making. This is exemplified, for instance, by the Mayor's 'One City'  
24 Approach, by the 'youth mayor' initiative and by the pioneering work of the Bristol Green  
25 Partnership<sup>1</sup>. The management of citizen participation in the project is led by a media arts  
26 organisation in the city (Knowle West Media Centre: KWMC). The organisation is not based in  
27 the Mimeo case study area but is known for its innovative work around digital inclusion in the  
28 city. KWMC have been working closely with the municipality and the universities in the city for  
29 a number of years to develop a framework that creates a smart city where 'the power of  
30 technology is harnessed to tackle the issues that people care about.' (KWMC, 2016). Their  
31 approach rejects an emphasis on the role of data, hardware and software in Smart City projects  
32 by seeking to include the knowledge and lived experience of the citizens within the community  
33 to address actual needs (Soderstrom, Paasche & Klauser, 2014). The stated goal of their  
34 approach is to collaborate with citizens to 'tackle local issues by enabling participatory  
35 processes, bottom-up sensor infrastructures and collecting, making sense and sharing relevant  
36 open data' (Balestrini, Creus, Masfarre & Canigearal, 2016, p. 3). The approach was designed  
37 in collaboration with a European wide think tank, who worked alongside KWMC to develop a  
38 set of research reports and booklets to communicate their ideas (KWMC, 2016; Balestrini et al,  
39 2016).  
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44 The Mimeo project is working in a 'case study' area in each city on the implementation of  
45 specific smart infrastructure. In Bristol a vibrant and diverse area of the city was selected. The  
46 population living in this area (N= 50,000 approx.) has the highest percentage of black or  
47 minority ethnic citizens (BME) in residence (44% whereas the city average is 16%). 51% of all  
48 accommodation in this area is flats, whereas the city average is 20%. The district also has the  
49 lowest levels of car availability in the city with (46% of households with no car, city average  
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53 <sup>1</sup> See <http://www.bristolnbn.net/wp-content/uploads/2012/08/18-01-09-City-Plan-Comms-Pack.pdf>,  
54 <https://www.bristol.gov.uk/youth-council-youth-mayors>, <http://bristolgreencapital.org/>  
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3 29%). According to the Department of Energy and Climate Change two areas within this district  
4 are in the top 10% of households in the country experiencing fuel poverty. Almost one third of  
5 the neighbourhoods within the district are classified as amongst the 10% most deprived  
6 neighbourhoods nationally. The number of recipients of out of work benefits is significantly  
7 higher than the city average (12.1%), with the rate in one neighbourhood amongst the city's  
8 highest at 26.2%. These multiple deprivations resulted in the area being granted European Union  
9 Objective 2 status and 'New Deal for Communities' status by the UK government.<sup>2</sup>  
10  
11

12 Mimeo is directed towards developing a suite of new technological designs including  
13 innovations around smart homes and retro-fitting of homes to become more energy efficient, the  
14 installation of electric bikes and vehicles and an electric vehicle charging infrastructure, an on  
15 demand electric bus service, the development of a Smart City platform and an energy demand  
16 management service. The challenge of diverse partners with competing motivations and desires  
17 meant that, although attempts were continually being made to embed citizen engagement and co-  
18 design into the project, this was challenging. KWMC recognised this and created a specific  
19 stream of work within the Mimeo project called 'Created By Us' in order to achieve their aims  
20 related to increasing the role of citizens. The focus was on 'Citizen Sensing': a process involving  
21 people building and using small and generally low-cost sensor technology to help them to collect  
22 data about issues of importance to them. It was hoped that the 'Citizen Sensing' element of the  
23 work would also feed into the design of some of the larger scale technological infrastructure  
24 projects.  
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27

28 Our own position on the project was as researchers tasked with researching the citizen  
29 engagement activities on the project. Our research aimed to explore the way that citizens, and  
30 their learning, were imagined and included in the Mimeo project. Instead of only offering  
31 description or critique our research was designed to uncover and explore the learning models and  
32 practices of citizen involvement in the Mimeo project. Our purpose was not to provide a  
33 framework for citizen engagement (as other projects have tried to do, see European Union, 2017)  
34 but rather, through in-depth empirical work, to illuminate approaches to digital learning that  
35 might support the participation of those often marginalised from conversations about digital,  
36 urban design.  
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39

40 The key project partners and associated partners brought into the Mimeo project in Bristol  
41 included a diverse array of organisations. Below the cast of actors important to the narrative and  
42 argument in this paper are introduced,  
43  
44

### 45 ***Overall co-ordination***

- 46  
47 • Municipality overall project lead: co-ordinating the whole city project and liaising with  
48 other cities involved.  
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53 <sup>2</sup>Statistics from

54 <https://www.bristol.gov.uk/documents/20182/928407/Ashley%2C+Easton+and+Lawrence+Hill.pdf/c83444ac-a3d8-4417-b967-b1c19ec3512f> accessed 14th Feb, 2018  
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- Municipality city pilot lead: co-ordinating the work in the city pilot, sits on the engagement sub-group

### ***Engagement subgroup actors***

- Municipality city pilot lead
- KWMC citizen engagement lead
- Ourselves

### ***Media arts organisation actors***

- Citizen engagement co-ordinator on the project
- Citizen Sensing co-ordinator
- Communications co-ordinator
- Others involved in the Citizen Sensing projects

### ***Others***

- Local community anchor organisations
- Large, commercial technology companies designing specific software and infrastructure.
- City/University technology partnership leading technical infrastructure development.
- Local SMEs involved in energy and transport actions, including e-vehicles and e-bikes, on demand bus service, connected homes

In the process of seeking informed consent confidentiality and anonymity were not promised to those involved. However, in reporting our findings names are not used and labels given when quoting individuals are deliberately ambiguous in order to avoid, as far as possible, directly identifying actors.

## **Questions, Methodology and Methods**

In this paper, we explore the following questions through detailed analysis of this case of a Smart City in the making:

- What learning models (assumptions about learners, theories about learning) circulate in the Mimeo project and what are their effects?
- How might a Creative Citizens model offer opportunities for critical, digital learning in Smart City planning?

Our methods aim to address some of the shortcomings of previous research in the area of Smart Cities; namely that there has been a ‘one size fits all’ (Kitchin, 2014) approach that has been based on ‘reading of corporate or government documents, rather than interview, ethnographies or genealogies that would add substantive insight’ (Kitchin, 2014, p.134). This previous approach has led to a foregrounding of business interests and a tendency to hide growing social polarization (Harvey, 2000). Our research recognises the need to ground critical Smart City scholarship within

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3 specific places, foregrounding the distinctive knowledges, concerns and challenges of marginal,  
4 often excluded citizens (McFarlane & Söderström, 2017).  
5

6  
7 The Mimeo project is funded for 5 years (2016 -2021). Our engagement in the field began as the  
8 project began and will finish in October 2019 when the major intervention in the city is due to be  
9 completed. By exploring learning in a Smart City in a specific location and time we are  
10 attempting to understand ‘situated bodies of practices, into which human actors are differently  
11 enrolled’ (Cowley et al, 2018, p.55). In order to understand citizen learning on the project we  
12 recognise a need to account for the conditional and changing local situatedness of people,  
13 policies, technologies and places that create the dynamic landscape in which the project operates.  
14

15  
16 We therefore sought to explore how citizen learning was constituted in relation between multiple  
17 and diverse actors ‘rather than as only imposed by state or corporate actors from ‘above’  
18 (Cowley et al, 2018, p. 55) To that end, one of us (name redacted), conducted participant  
19 observation by becoming embedded with the actors involved in the project from municipality  
20 employees to EU project documentation to community engagement partners. This supported her  
21 to understand how ideas of the citizen and their learning circulated both formally through, for  
22 instance, project team meetings and measurement metrics, and informally through conversations,  
23 everyday encounters and materially in the district.  
24

25  
26 The data generated include observations of nine whole project team days, twenty-seven other  
27 meetings, including engagement and communication group meetings and ten workshops held  
28 with local organisations and citizens, producing in-depth fieldnotes from meetings and events.  
29 Details on how citizen learning was discussed by these project partners were carefully noted and  
30 any changes over time specifically recorded. Cope also conducted twenty face-to-face interviews  
31 with project partners and organisations, which she transcribed herself, including those who were  
32 not formal partners on the project but were brought in as the project evolved, for instance, anchor  
33 community organisations in the locality.  
34

35  
36 Discourse analysis of key texts, project documentation and online communications was also  
37 undertaken. As we were particularly looking at the citizen engagement package in the Bristol  
38 case study site, we spent time with, and worked alongside, the KWMC staff, joining their team  
39 meetings and recording their approach throughout the project. In all of our work we were looking  
40 for where accounts of learning became visible and we followed the actors, attending smaller  
41 meetings and having informal conversations as and when interesting data emerged.  
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44  
45 Data were analysed iteratively and analysis was carried out using Nvivo software, following a  
46 thematic approach. As the themes emerged from the data analysis, the approach to the research  
47 could be iteratively developed, in collaboration with the engagement subgroup (see cast of actors  
48 above). Interview schedules were adapted to reflect findings as they emerged and to build on our  
49 understandings of citizens and their learning as the project was rolled out.  
50

51  
52 We worked with a relational ethics framing in which our ethical practice went beyond the  
53 procedural or even the situational to continuously ask ourselves and others involved questions  
54 around privacy and consent (Ellis, 2007). This is especially important as we are working in the  
55 city in which the project is located. As researchers working alongside the project and wanting to  
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3 support work around citizen learning we recognised the need for ongoing ethical sensitivity  
4 around disclosure and the negotiation of access to different actors and sites (Scott & Russell,  
5 2005). Engaging in ongoing analytical reflection on the relationships we were developing and  
6 how they might influence actors to speak to us, or not, about certain elements of the project  
7 required us to be very clear throughout on issues related to informed consent and the  
8 impossibility of complete anonymity. Our collaborative approach created constant tensions  
9 between telling a positive story of the project and making visible the tensions and contradictions  
10 we observed and heard about from the actors. Our key interlocutors in the project were the  
11 ‘engagement sub group’ comprising the municipalities project manager for the city pilot, the  
12 project manager from the media arts organisation involved and ourselves.  
13  
14

### 15 16 **Section 3: Findings**

17  
18 In this section we use our data to illustrate, unpick and discuss the models of learning circulating  
19 within the Mimeo project, how and where they emerge and what their various effects are on  
20 citizen participation in thinking about digital, urban futures.  
21

#### 22 23 **The Dominance of the Banking Model**

24 In general, perhaps not surprisingly given previous studies of Smart Cities, the dominant model  
25 of learning we observed on the Mimeo project focussed on the need for the inhabitants in the  
26 case study area to adapt to new digital infrastructures, largely viewing ‘citizens’ as consumers  
27 and service users. Inequalities, everyday lives and experiences of the citizens, and hierarchies of  
28 knowledge and power, are edited out of this model.  
29

30  
31 From the beginning a communication working group was set up to publicise the project to  
32 different audiences, particularly to inhabitants in the case study area. Communication was largely  
33 ‘broadcast’ in order to inform people in the area about the project and the benefits of Smart  
34 Cities. This was despite the fact that the municipality were aware that inhabitants in the selected  
35 area had various existing, historical relationships with the municipality, with the funding body  
36 (the EU), and with the notion of Smart Cities that might affect their participation. These  
37 understandings were not taken seriously in communicating the project, as can be seen below,  
38  
39

40 ...as an EU funded project people do question whether it’s relevant to them so there will  
41 have to be education about relevancy and how, if a community organisation does get  
42 involved, it can benefit the community and they can have a part in making that happen.  
43 There is a little bit of reticence but generally the more you talk to people the more excited  
44 they become. (Interview, municipality project worker)  
45

46  
47 Here, little attention is given to the ongoing histories and everyday experiences that might have  
48 led to the ‘reticence’ referred to or, indeed, in what might lie behind their reticence. In fact, a  
49 local community organiser noted that the whole premise of the project and the technologies  
50 being designed failed to engage with the realities of lives lived in this area of the city when she  
51 suggested that,  
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53  
54 if you are relying on smart phone and broadband technology don’t pick an area where  
55 most people are on pay as you go basic phone or the whole of an area which doesn’t have  
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3 decent broadband connection. People in high rise or social housing have key meters<sup>3</sup> and  
4 they don't have the ability to change those things. (Interview, local community organiser)  
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6  
7 This 'broadcasting' approach to citizen learning about the Mimeo project was paternalistic in  
8 tone and tended to homogenise people. For instance, one piece of advertising for the project tells  
9 a story of an 'average household' where everyone switches on their kettles following the end of  
10 England's run in the football world cup (2018). This is used as an example of energy demand  
11 spikes which are '*bad for the environment as it's usually the polluting energy sources that are*  
12 *able to meet this short-term demand.*' (Mimeo project advertising, 2018). In these processes we  
13 see the cultural diversity of inhabitants in the area being edited out and the messages from the  
14 project addressed to individual as consumers. They are invited to adapt to and adopt new  
15 technologies to improve their lives (and potentially the planet), in mostly rather instrumental  
16 ways. The culturally diverse inhabitants in the area are therefore framed primarily as polluters  
17 who need to be told how to behave better, rather than active learners able to engage in thinking  
18 about behaviour change around energy use. The double irony here is that the Smart City  
19 engineers and civil servants involved in the international air travel necessary for the Mimeo  
20 project are much more likely than these inhabitants, often non car owners and perhaps less likely  
21 to engage in international travel, to be those responsible for significant carbon emissions.  
22  
23  
24

25 The problems with such an approach became clear in workshops held with inhabitants in the area  
26 during the project development where this top down, broadcast material was described as  
27 'propaganda' by some of the participants. Participants discussed how words such as 'smart' and  
28 'data' were alienating. They also argued that inhabitants in the area do care about the ethics of  
29 new digital infrastructures by pointing out the general scepticism about data privacy following a  
30 facebook data scandal (2018) and that there was a perception that 'everything smart is being  
31 hacked into' (workshop participants, June 2018). Despite this clear engagement with key ethical  
32 issues inherent within Smart City planning the idea of inhabitants in the area as vessels waiting  
33 to be filled with the knowledge necessary to encourage their involvement was all-pervasive. One  
34 of the technology partners, for example, told us,  
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37  
38 There is a lot to be understood in terms of education, explaining to people what a smart  
39 appliance is, explaining to them in a meaningful way how it might be beneficial to them  
40 in the future, to Bristol, the environment.  
41 (Technology developer, interview)  
42

43  
44 Throughout the project we noticed that people in the area were imagined as passive users of  
45 technology and/or uninterested or not skilled enough to engage in co-creating the Smart City.  
46 This is despite the linguistic appropriation of the ideals of co-design, or user centred design  
47 (UCD) in the talk surrounding the project. For instance, one of the partner technology companies  
48 claimed to be adopting a UCD approach whilst simultaneously explaining at a team day that in  
49 their lab-based simulations citizens are represented as Minions from the popular film franchise  
50 Despicable Me<sup>4</sup>. Although humorous, this demonstrates an implicit model of homogenised,  
51  
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53 <sup>3</sup> Key meters are pay as you go meters for domestic energy consumption

54 <sup>4</sup> Minions 'live to serve, but find themselves working for a continual series of unsuccessful masters (Animation  
55 source, retrieved 2018).  
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3 passive citizens assumed to need to learn certain ways of behaving in order to engage with the  
4 smart infrastructure. Interestingly, the idea of an entrepreneurial citizen ready to take advantage  
5 of new smart infrastructure is barely visible in relation to the inhabitants living in the case study  
6 area of this project.  
7

8  
9 There is a sense too, expressed by the programme manager, that understanding and engaging  
10 with smartness is not a priority in ‘the citizens’ lives. One solution to this was to hide digital  
11 infrastructure through processes of automation as described below,  
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13  
14 From my perspective people are really interested when they get data about their energy  
15 use for the first few months and then they forget it so the key thing for us is how to  
16 automate it. Previously people used to just turn some lights off but people want to spend  
17 time with their families rather than worrying about turning off the lights so how do we  
18 automate that stuff as much as possible?  
19

20 (Interview, Municipality worker)  
21

22 As the digital layer is made invisible, as described above, so too is the potential for critical  
23 digital literacy learning. The potential for the devices themselves to be used to encourage digital  
24 learning is overlooked on the project. Inhabitants of the area are largely seen as data points in  
25 relation to the smart devices being put into their homes. Therefore, opportunities for knowledge  
26 production and learning to take place between the data gatherer and the data provider, in  
27 dialogue, are not developed. For instance, where smart devices have been put in the hands of  
28 inhabitants they are not supported to understand the data being collected or consider how it  
29 might be useful in their lives, potentially altering their energy use and therefore their bills. As  
30 Hollands, (2008, p.306) suggests, assumptions that the technology itself can bring about  
31 transformation in communities without citizen’s active and informed engagement, raises  
32 questions around,  
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34  
35 how, and in what way is it being transformed?’ , but it also automatically assumes that  
36 there is some kind of community ‘consensus’ and involvement in the transition, and that  
37 such a change is inherently positive.  
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39  
40 All of these observations suggest that the knowledge hierarchies at work in the project de-value  
41 the historically constituted concerns of the community in favour of a particular ‘smart’ vision of  
42 being and living in the city, where citizens are understood as consumers of new technologies,  
43 rather than active participants in mobilising technologies for their own purposes and to reshape  
44 the city. Negotiation between these different knowledges and the potential to build new  
45 connections is challenging on the project for a variety of reasons which we go on to explore later  
46 in the paper in our discussion.  
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### 50 **Creative Citizens Model**

51 A different model of learning, which we call the Creative Citizens model, operated in the  
52 Created By Us element of the Mimeo project run by KWMC. This approach situates learning in  
53 historically constructed, unequal relations of power, knowledge and resource, it recognises the  
54 significance of learner diversity and is focused on how inequality might be challenged through  
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3 working alongside individuals and communities to discover what animates them, but also in  
4 thinking about how they might be connected into powerful processes at work in the city.  
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7 In initial conversations with anchor community organisations in the area it became obvious to  
8 KWMC and ourselves that there was a disconnect between the everyday lives of many of the  
9 inhabitants in the case study neighbourhood, and the ‘smart’ technologies being introduced and  
10 discussed on the project. This key tension was discussed with one of the project managers at  
11 KWMC who suggested that,  
12

13  
14 the technology doesn’t mean anything to the community and so [we are] trying to steal  
15 that space where technology is developed based on its meaning and its purpose to real  
16 people. But these real people having a part in that is challenging.  
17 (Interview project manager, media arts organisation).  
18

19  
20 As KWMC did not have a long history of working in the targeted area they recognised that they  
21 needed to understand better the histories and knowledges held in the local community. A first  
22 step involved inviting local anchor organisations to discuss their possible participation. Many of  
23 the community practitioners were very dubious about the effectiveness of using digital media to  
24 tackle inequalities and felt that there were a range of other priorities in citizens’ lives that should  
25 be given priority (fieldnotes, March, 2017). Taking into account historical relations of power,  
26 and negative feelings towards both the municipality (in a context of UK austerity) and the EU,  
27 meant that drawing these local knowledges from local civil society organisations and inhabitants  
28 into Mimeo needed to be carefully managed. As one of the project managers observed:  
29

30  
31 Quite rightly some of the organisations were apprehensive even before it started but for  
32 me having seen how those negotiations have been done and how careful you have to be  
33 this has been a great learning process. And I think if you want to test out anything with  
34 people then you have to build in the groundwork to introduce the project properly,  
35 finding and respecting the key stakeholders who are already in the community and  
36 working from there.  
37 (Interview project manager, media arts organisation)  
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40  
41 Connecting with community anchor organisations in the area, which had been overlooked in the  
42 bid writing, here helped KWMC to connect with the huge amount of knowledge, understanding  
43 and research around the key assets, concerns and challenges faced by those living in the area.  
44 This included integrating the findings from a timely publication of a community research led  
45 project that had identified a key set of priorities around quality of life for inhabitants of the area.  
46 For instance, when asked which services were important to people’s wellbeing, over half of  
47 respondents in the area pointed to parks and green spaces. These were also identified as a key  
48 focus for municipality investment (Up Our Street, 2017). This community-led research  
49 questioned the assumption in the Mimeo project that ‘smartness’ will deliver a better quality of  
50 life. Instead, these findings suggested more green spaces (we might argue the opposite of  
51 smartness) was what was truly desired.  
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54 Starting with the everyday issues of concern to residents and providing diverse opportunities for  
55 engagement and learning, meant that this work stream began to switch away from a focus on the  
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3 technology and the narrow, technocratic deliverables of the Mimeo project. As a result, this  
4 methodo-political work was silo-ed, largely because the inhabitants' concerns did not connect  
5 with the technological developments listed in the project deliverables. Despite this, the  
6 experimental work that took place through Created By Us continued, this was because the  
7 municipality project team were committed to trying out different models of digital learning with  
8 marginalised communities in the city. As a result, the 'Citizen Sensing' strand of activity began  
9 to take shape.  
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14 Initial activity designed by KWMC in the project area involved in depth, informal on the ground  
15 work involving artists and community development workers 'hanging out' and beginning  
16 conversations in local chicken shops, cafes and nailbars. Several issues emerged including  
17 concerns around damp homes and poor air quality. Both issues connected with wider concerns  
18 that had been expressed in the community-led quality of life research (Up Our Street, 2017).  
19 Initially the damp homes issue gathered momentum, partly because it connected with multiple  
20 local concerns including health issues, social stigma and poor-quality housing, demonstrating the  
21 complexity of connections between issues faced by marginalised communities. In order to  
22 challenge knowledge hierarchies in the city it was deemed essential to connect these emerging  
23 local concerns with powerful processes and people in the city. This was possible as these  
24 concerns around health, social and housing inequalities were also shared by many local  
25 organisations and by policy makers in the municipality. In addition, computer scientists and  
26 technologists, open data and other experts were interested in exploring how sensor data might be  
27 utilized by citizens to understand the issues of concern in more depth. Out of this dialogue, the  
28 'Damp Busters' (Citizen Sensing) project emerged. Citizen Sensing involves collaborating with  
29 citizens on the development of low-tech sensor infrastructures and supporting them to make  
30 sense of and share the knowledge gained through the sensor technology.  
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35 In developing this work, the importance of connecting lay knowledges with expert knowledges  
36 in order to generate dialogue between them became clear. The mutual exchange and learning  
37 required was challenging, particularly when innovative technologies, often seen as 'irrelevant' in  
38 the area, were at the heart of the inquiry,  
39

40  
41 It's great to have different partners from different worlds, it's a challenge as well, but  
42 the level of expertise is amazing - to speak to someone who is creating a cutting-edge  
43 network the like of which has not been seen before is a challenge but it's also exciting  
44 to connect people up who might not have had the chance to access those sorts of  
45 technologies.

46 (Interview, project manager, media arts organisation)  
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48  
49 The role of KWMC was vital here in 'holding' (in the psychoanalytical sense of 'holding'  
50 emotions and doubt so that they are manageable, see Bion, 1984; Bibby, 2009) the collaboration  
51 at the early stages, which required them to support the translation of knowledge and ideas across  
52 the different groups involved. The importance of offering multiple and varied opportunities for  
53 participation and involving a diverse team in order to facilitate the inclusion of citizen  
54 knowledge and to challenge unequal relations of power quickly became obvious. Artists,  
55 technologists and engagement specialists designed and offered a wide range of opportunities for  
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3 learning and participation including workshops, hack days and working on design briefs  
4 together. Participation across the activities varied, as a KWMC project manager explained,  
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7 We didn't get hung up on everyone attending everything, it wasn't that we were going  
8 to do lots of hackdays. We offered a range of different activities to keep people on  
9 board.  
10

11 Learners were seen here as active in understanding what they might want or need to learn and  
12 how Citizen Sensing might help them to do so. Digital learning opportunities involved diverse  
13 groups of people coming together in practice based, material encounters bringing the technology  
14 design into relation with the everyday lives of those living with damp. Learning here was  
15 understood as both relational and material, involving engagement with artefacts and policy  
16 agendas. For instance, social tenants worked alongside the tenancy officer in the municipality to  
17 identify and target private landlords who ran damp properties in order to challenge those who  
18 were not acting ethically.  
19  
20

21 In addition, a focus on critical engagement with the actual technologies was visible in events  
22 throughout the damp project that offered people opportunities to play with sensor technologies  
23 and other digital, material devices. Technologists as well as residents in the area, academics, civil  
24 servants and others took part. The events were designed to share knowledge and expertise and to  
25 demystify terms like 'data' and 'sensor technologies'. In this way an open design process was  
26 created where different knowledges were put into conversation in order to open up new questions  
27 around digital, urban futures (Storni, Binder, Linde & Stuedahl, 2015). Autonomy and creativity  
28 were encouraged in these workshops where the processes and the digital tools and interfaces  
29 were designed as 'tools for conviviality' to encourage engagement among and between people  
30 and the city environment (Illich, 2002). This contrasted strongly with the 'UCD' approach  
31 (remember the Minions) adopted by the technology companies involved.  
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35 The Citizen Sensing group built a prototype sensor together using open technology. The tool was  
36 designed in response to a real concern raised by those involved in the design process. This  
37 'making together' approach (Ingold, 2013) enabled those who were not technology experts to see  
38 how things are put together and to build knowledge about sensors and their design. The co-  
39 design process also supported inhabitants of the area to ask questions around data and ethics that  
40 related to their everyday lives and concerns. As a KWMC project manager suggested, it was  
41 important that the interface itself was user friendly, however,  
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44  
45 what was really important to the citizens was 'I want to choose when it's switched on,  
46 what happens with the data, I want to know who the data is being shared with'.  
47

48 The interface that was co-designed in order to house the sensor technologies in people's homes  
49 was in the shape of frog. The frog, who loves to live in damp places, became an accessible  
50 material symbol for the project that linked the digital data being collected with the everyday lives  
51 of those experiencing damp. It was designed to be as attractive and easy as possible to use.  
52 Notably, the intention here was not to make the infrastructure invisible to citizens, rather, tenants  
53 in the five households involved in the testing phase were trained so that they all understood how  
54 the technology worked and what data it was collecting. Through the co-construction of a data  
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3 agreement, issues related to data ownership were experimented with, allowing different voices to  
4 be heard in the process, and raising awareness of the various concerns of all of those involved  
5 from the sensor developers, through to the landlords, municipality officers and residents  
6 themselves.  
7

8  
9 In terms of the sustainability of the work a national sustainable energy organisation worked  
10 alongside 16 people to support them to become 'Community Damp Busters' - a knowledgeable  
11 local team of people able to support others with damp issues in their neighbourhood.  
12 Interestingly, the focus of the action very firmly moved away from the frog sensors and their  
13 deployment to the issue itself. As the KWMC project manager explained,  
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15  
16 Although the frog became a symbol for the project the real focus is on making a  
17 difference. If we had more information, like if we knew who owned the property, then  
18 we could ask are these buildings fit for purpose? The key thing to keep momentum  
19 going is to empower people to make changes.  
20

21  
22 The Created By Us Damp Busters project offers us insights into how practices of situated,  
23 critical learning might be adopted with citizens on a Smart City project. This involved  
24 accounting for the everyday lives and unequal relations of power, knowledge and resources in  
25 the area. The approach stresses the need to provide multiple and varied opportunities for  
26 participation, including those that are creative, encourage autonomy and involve linking citizens  
27 into powerful processes and people in the city. Direct engagement in building technologies  
28 together also has the effect of making visible technology design processes and, in particular,  
29 ethical issues that may be significant barriers to the implementation and sustainability of Smart  
30 City infrastructure.  
31

### 32 33 **Conclusion** 34

35  
36 The current model of learning that tends to surface in these complex Smart City partnerships  
37 prioritises the technologies and the infrastructure development associated with them and  
38 therefore struggles to account for the inhabitants in the area. A top down delivery mode where  
39 residents are largely seen as consumers, service users and recipients of information about Smart  
40 City development cannot account for the complexities inherent in the situated, historical relations  
41 and lived experiences of those in the area. Instead, workshops, online materials and project  
42 documentation are designed to 'educate' people about the benefits of smart technologies, rather  
43 than engaging with their expressed concerns. The banking learning model that gained  
44 prominence in the Mimeo project, imagines citizens as needing to learn how to use digital  
45 infrastructure and tools that have been designed by others to 'improve' their lives, it  
46 homogenises citizens and their learning, sometimes ignoring the role of citizens entirely. The  
47 approach is one where either the digital operates as an 'invisible' layer working behind the  
48 scenes in citizens' daily lives or is one where citizens might need to be taught digital 'skills' in  
49 order to enable them to use the technologies, with no critical engagement. Although a practical  
50 approach to getting things done on the project to the satisfaction of funders, and for the  
51 development of new smart infrastructure, this approach cannot take account of the diversity  
52 within community and assumes a passive 'empty' citizen upon whom a digital layer can be  
53 easily overlaid. This negates the ongoing everyday lives of citizens and the complexity of the  
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negotiations necessary in building and embedding smart infrastructure. In addition, the focus is on a narrow set of digital skills needed in order to make the smart technologies work and deeper critical engagement around some of the key ethical challenges in building a smart city together is considered out of the reach of ordinary citizens.

Despite a genuine desire to include citizens in the Mimeo project it remained difficult for the team to do so. Writing a successful, ambitious and innovative bid had created a constant tension running through the project in balancing the roll-out of the technological infrastructure with what could be delivered on the ground that might be of benefit to local residents. Our argument in this paper is that in order to include citizens in Smart City planning much greater reflexivity is needed around models of learning, and assumptions about citizens and their capacities and interests. In particular, early discussion of different learning models and the collaborative design of developmental practices with all partners is necessary.

Our argument is that a model of learning that foregrounds collaborative, creative, critical learning for all involved is necessary in order to include citizens in powerful urban design processes. This requires significant commitment from policy makers, technology companies, funders and citizens themselves and the work needs to be brought out of the silos of sub projects and 'engagement activities' and into mainstream Smart City policy and practice. It is only in this way that we can begin to weaken the hold of neoliberal, technocratic approaches in the critical imaginations of those involved in smart urban planning (Cardullo and Kitchin, 2018; Joss et al, 2017).

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