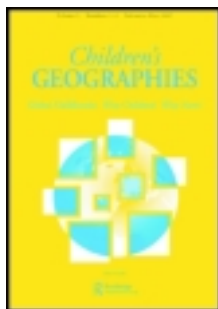


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Children's Geographies

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/cchg20>

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Published online: 18 Jun 2009.

To cite this article: Marion Walker, Duncan Whyatt, Colin Pooley, Gemma Davies, Paul Coulton & Will Bamford (2009) Talk, technologies and teenagers: understanding the school journey using a mixed-methods approach, *Children's Geographies*, 7:2, 107-122, DOI: [10.1080/14733280902798829](https://doi.org/10.1080/14733280902798829)

To link to this article: <http://dx.doi.org/10.1080/14733280902798829>

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Talk, technologies and teenagers: understanding the school journey using a mixed-methods approach

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This paper focuses on the methods used in a project which set out to capture the movements and to consider the wellbeing of 30 teenagers on their journeys to and from school. A mobile phone linked to a GPS receiver was used to automatically log travel patterns whilst the respondents added 'blog' images and text about how they felt on the journey. Follow up interviews further explored the data. The paper shows that by using a range of methods the young people became involved in the project in different ways providing a rich picture of contingent and complex school journeys.

Keywords: young people; mobile phones; routes; photographs; texts; interviews

Introduction

There are strong environmental and health reasons for encouraging children and young people to walk to school (Hillman *et al.* 1990, DfT 2002, DCSF 2007, Tranter 2007), but relatively little is known about their potential exposure to air pollutants, and the consequent impacts on respiratory health, of different modes of school travel. This in-depth study used mobile phones, GPS (Global Positioning System) and GIS (Geographic Information System) technology to integrate precise spatial data about young people's school travel patterns, and their personal wellbeing, with modelled information on pollution levels to derive personal estimates of exposure to air pollution. The wider remit of the project was to assess the degree to which these technologies could be utilised to generate richer forms of information about personal mobility and exposure to traffic-related air pollution (Harvey and Chrisman 1998, Gulliver and Briggs 2005, Whyatt *et al.* 2007).

Traditionally GIS has been used mainly as a quantitative tool but recent work has developed 'participatory GIS' and the integration of qualitative work into GIS modelling (Pavlovskaya 2002, Elwood 2006, Berglund and Nordin 2007). For example, Berglund and Nordin (2007, p. 469) show that 'GIS is effective in engaging children and a good tool for accumulating and processing children's knowledge about their environment'. Cinderby (2007) also shows that GIS is an effective means of capturing and conveying young people's views about their local environment

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to local planning authorities. Building on the recent research using GIS with children and young people and in particular, on the work of Knigge and Cope (2006, p. 2035), which demonstrates a method for using GIS and ethnography to enable ‘rich explorations of *place*’ (original emphasis) this project uses a mixed-methods approach, combining GIS and innovative technology with qualitative methods, to gain a deeper understanding of the school journey.

Recent studies exploring the school journey have tended to focus on the ways in which primary-aged children travel and engage with the environment on the school journey using a range of techniques including children’s writing, drawings and photographs (Mitchell *et al.* 2006, Ross 2007). Earlier work by Matthews (1983) offers us an insight into the ways in which a group of school children, aged between 6 and 11 years, ‘comprehend the world about them’ (1983, p. 89) through the use of free-recall maps of the school journey. Consideration has also been paid to young people’s perspectives of their social and community environments and how the connection they make with these environments affects their wellbeing (Matthews *et al.* 1998, Percy-Smith and Matthews 2001). Morrow (2001) included map drawing and photographs, amongst a range of methods, with a group of young people aged between 12 and 15 years, to explore quality of life issues, including health and wellbeing, in order to ‘build up a picture of how children and young people view their social networks and their communities’ (2001, p. 256). Mackett *et al.* (2007) used diary keeping and GPS monitors to investigate children’s independent movement in their local environment, arguing that children should be allowed out more without an adult. Working with primary-aged children, and focussing on those who walk to school without adult accompaniment, Ross (2007) draws attention to the active and imaginative engagement the children make with the environment on the school journey. Ross aside, very little attention has been paid to the ways in which young people travel and engage with the environment on the school journey. This study therefore builds on the work of Ross (2007) by contributing to the growing body of research concerned with children’s travel and engagement with the environment on their school journey, and on the micro-geographies of young people, by considering the school journey experience for secondary-aged pupils.

In this article we begin by outlining the methodology and the ways in which the research process evolved through the methodological triangulation of the data (Mason 1996). We then go on to discuss the problems and potentialities of using mobile phones and GPS technology as methodological tools with young people in school. The paper argues that this mixed-methods approach provides an inclusive methodology for students with a wide range of academic abilities, including those with poor literacy skills and those with English as a second language.

Methodology

The research was carried out with a group of 30 ‘young’ teenagers (aged 12–14 years) during four 1-week study periods in 2007. Seasonal change affects air quality hence the study periods in winter, spring, summer and autumn were chosen to reflect seasonal change. The project set out to utilise the latest developments in mobile phone technology by capturing both the movements of the young people in space and time on their school journeys and their perceptions of wellbeing on those journeys, through the use of time and place annotated photographs and text captured using a customised mobile application, GeoBlog. For the study periods each participant was provided with a mobile phone pre-installed with GeoBlog linked to a Bluetooth-enabled GPS unit (for more details see Bamford *et al.* 2008). The application was developed specifically for this project and was designed to:

1. Log the data received from the GPS receiver at one-second intervals in order to record the routes that the young people took to and from school.

2. Combine textual and photographic information from the young people in the form of blog entries stored on the phone with data obtained from the GPS receiver, thereby adding location-based context to these blogs.
3. Provide a simple interface to collect further information¹ (see Figure 7 for an example of how data may be visually represented using GeoBlog).

The young people were asked to use the mobile phones to take pictures and to write texts of things that 'interested' them on their journeys to and from school. We specifically asked them to capture, 'things they liked and things they didn't like' about the journey. This mixed-methods approach generated routes, photographs and texts of the young people's school journeys but as Morrow (2001, p. 266) points out, 'a photograph has no meaning in and of itself, it is the interpretation and explanation that is important – in this case, the participants' own explanations of why they had generated the images they had'. Clearly, interpretation of these visual data required a situated knowledge (Rose 1997) to place the data within their cultural and spatial contexts (Banks 2001, Collier 2001). In order to gain a deeper insight into the factors affecting the young people's routes and their choice of photographs and texts, follow-up interviews were conducted with each participant after each period of data collection. In this research-in-practice paper we discuss the methodological and ethical issues experienced, especially from the perspective of the researcher (Walker²), working in school with the young people, the teachers and the technology.

Research sample

The study was conducted at a comprehensive school, where we had an established working relationship with a former colleague Miss Smith, who is now a geography teacher at the school (the participant's names have been changed; the young people chose their own pseudonyms). The school is an academically non-selective school for 11–18 year olds situated in northern England. Compared to similar schools nationally the school 'has fewer of the most able students . . . and attracts many local students from some of the most socially and economically deprived parts' of the town (Ofsted 2006). The school is a faith school and as a consequence attracts pupils from its catchment area and beyond. Working at a school with a wide catchment area provided us with teenagers using different modes of transport on their journeys to and from school.

The research team introduced the project with a PowerPoint presentation to a Year 8 school assembly. We explained that at the end of the project participants might be able to keep a phone and then we asked for volunteers. All 172 pupils were given a short questionnaire, which included a parental/guardian consent form, to take home and complete. The questionnaire asked for home postcode, mode of travel to and from school and existing symptoms of respiratory illness. Forty-two questionnaires³ were returned and then analysed using a number of variables (including gender, location of home address/and in some cases their 'second home',⁴ mode of transport, history of illness, range of hobbies and degree of activity) in order to gain a sample of 30 young people that had an equal gender mix and reflected the range of abilities and social backgrounds within the school. The sample contained two pupils of European origin, with English as a second language, although the pupils in the school and the sample were predominantly white British.

Letters were then sent to all of the volunteers inviting 30 to join the project. We wrote to the remaining 12 volunteers asking them to join the reserves, explaining that 'if some-one drops out . . . we may ask you to take part in the survey later on in the year' (Field Notes, Survey 1). At this point one pupil dropped out immediately after having received her letter of 'congratulations' because she said it looked like 'hard work'. Her friend then asked to be removed from the reserves signalling to us that peer pressure and friendship bonds might affect participant

retention over the course of the year. At the start of Survey 1 the project team was made up of 30 participants and 10 reserves.

Generating the data

The participants were issued with a kit, made up of a Nokia 5500 mobile phone with a built in camera, a Nokia Bluetooth GPS unit, a phone charger and a set of instructions on the Thursday lunchtime prior to the first week of data collection. Friday lunchtime was used as a drop-in session for ‘trouble shooting’. The following Monday we met at lunchtime to check the phones for data. The Monday following data collection the participants returned the kit and the data were then downloaded from the phones. The format for issuing, checking and collecting the kit was maintained for the four survey periods to provide a routine for the participants. In addition, working within this framework helped the researcher to liaise with the staff, both teaching and non-teaching, so that lunchtime visits became less of an event and hence less intrusive on the school day. These regular visits helped to develop a working relationship with the staff and visibility in school impacted positively on the relationship the researcher developed with the participants. Most of the teenagers came along to the drop-in sessions for an informal chat and as a consequence the interviews became more relaxed over time.

Developing a rapport with the teenagers was also made possible via the phones. The phones arrived with £10 of ‘free’ credit, which encouraged most of the participants to use them. We sent the young people text messages with reminders to charge the equipment and to attend meetings. Their text responses provided us with an indication of those who were coping well with the task (e.g., one text stated ‘Hi this fone is cool’) and of those in need of help, as the field notes below illustrate. No response was also considered to be a potential indication of lack of engagement:

I had 22 messages this morning. Six from pupils panicking that they can’t get a signal – including one at 10.44 pm last night ‘help my GPS isn’t working’ and one from a boy this morning saying he’s half way to school and he can’t get it to work. (Field Notes, Survey 1)

In total the teenagers collected: 962 photographs (834 with texts, 128 without) and 1080 routes over the four survey periods. The quality of the routes varied and we classified them as follows:

- 111 ‘high quality’ routes (complete, no gaps or scatter)
- 148 ‘medium quality’ routes (usable, but with some gaps or scatter)
- 402 ‘low quality’ routes (incomplete and ill-defined)

In addition, there were 419 occasions when route data were not captured due to problems of obtaining an initial GPS fix. The amount and quality of route data captured by the teenagers is summarised in Figure 1. Sarah, for example, recorded 13 high quality routes, 4 medium quality routes and 13 low quality routes. Katie, in contrast, recorded 0 high quality routes, 2 medium quality routes and 11 poor quality routes. Issues of route quality are discussed in Whyatt *et al.* (2008).

After each period of data collection an interview timetable was drawn up with help from Miss Smith. Interviews were scheduled to coincide with the participant’s humanities lessons; mostly geography but occasionally history and RE lessons. Over the year a total of 113 interviews were conducted in the humanities office; a small ante-room with an adjoining door to the main geography classroom. The interviews, lasting 15–20 minutes were taped and transcribed, with permission from the young people. A semi-structured interview framework allowed the interviewer to work with a series of themes and to follow through with any unforeseen issues. The first interview theme, ‘tell me about your school journey’ was adopted to ease the participants into the interview process (Valentine 1997). We talked about their journeys in general terms and then, for those who had them, we looked at their photographs and text messages on a laptop. The second interview theme, ‘what I see and how I feel on the journey’ focussed on

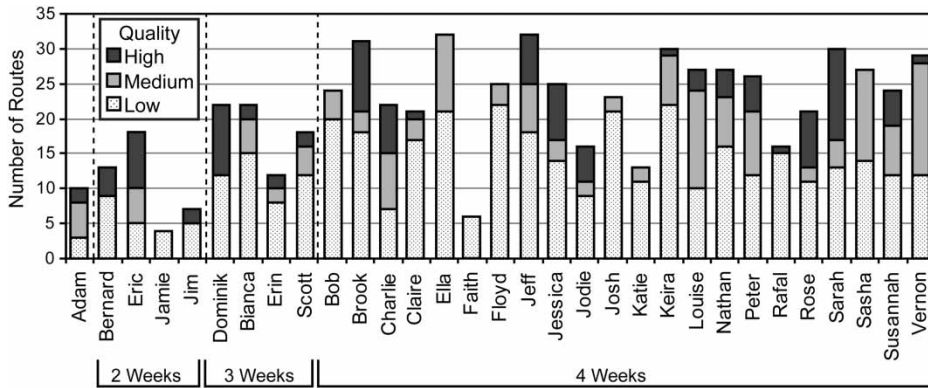


Figure 1. The quality of route data varied between the young people.

what they liked and disliked about their journeys. Again we looked at their photos and texts on the laptop but this time we also looked at a paper copy of their 'best' route. By the third interview all of the data were represented visually on the laptop and this helped us to focus in more detail on their journeys when we talked about 'places to avoid and ideal journeys'. The fourth interview theme 'clean-up, context and change' provided an opportunity to follow through with any issues that had not been dealt with fully in previous interviews and to talk about any travel changes that may have occurred as the young people moved up in school from Year 8 into Year 9. There were occasions, however, when we stopped talking about the school journey and chatted about unrelated issues such as their hobbies and life at home and in school. Although these topics may not have been entirely relevant to the research nevertheless as Harden *et al.* (2000, 4.3) also found, talking about issues such as football, skate boarding, msn and dancing helped to 'foster a dialogue' with the young people and this enabled us to build a rapport over time in successive interviews.

This description implies that the interview process was linear and uncomplicated, however, the reality was that it was 'messy' (Bassegy 1999). The intention was to create as little disruption as possible, for both the teachers and the pupils as we tried to fit in with the school timetable. Asking to visit a school on the last week of any school term is not a good idea, nor during the lead up to and during examinations, but complications, such as school sports day and school concerts, also dictated when it was feasible to conduct interviews as the following extracts illustrate:

The timetable was immediately changed on the first day because some of the participants were away on a three-day residential school trip. So once again I had to go with the flow. (Field Notes, Survey 3)

The Sound of Music rehearsals are losing us interviews. The school timetable is non-existent and the classes are not where they are timetabled to be, so I'm just doing my best to track the pupils down in the hall and the library. (Field Notes, Survey 3)

Moreover, the methodological process involved the issue and use of the kit on four separate occasions. Table 1 shows that there were complications working with the teenagers over the space of a year; some of the participants dropped out, but a core of 24 teenagers remained on the project for the year.

Making sense of the data

We asked the teenagers to test the technology by collecting route data, taking photographs and writing texts of things that interested them whilst emphasising that we did not want them to

Table 1. Issuing the kit and working with the young people over the year

Survey 1

30 phones issued

29 phones used (1 participant absent through illness for data collection)

30 interviews (digital voice recorder failed for 1 interview)

4 pupils opted out

Survey 2

28 phones issued (1 participant absent for issuing of kit and during week of survey)

27 phones used (1 participant absent and 1 data set lost during download)

27 interviews (including one joint interview due to school timetable clash)

2 pupils dropped out because they left the school

Survey 3

29 phones issued (1 participant away on holiday)

28 phones used (1 participant did not attempt to collect data and then opted out)

28 interviews (including 2 new participants)

Survey 4

28 phones issued

28 phones used

28 interviews

change their routes. We were aware that a power imbalance not only exists within the adult/teenager and teacher/pupil relationships (Greig *et al.* 2007) but also between the researcher and the researched (Hemming 2008). We had provided the young people with a set of tasks we wanted them to undertake. Nevertheless, the teenagers were in control of the research process during the school journey. This raises issues about how we, as the ‘analysts’, need to provide transparency to the research process by acknowledging that the young people were in effect also ‘researchers’ (Kindon 2003). There is no doubt that we will have influenced their photographic choices and written text messages (and in some cases the routes they took), both in their quest to please so that they could ‘earn’ a phone, and as the study progressed when we talked in the interviews about the journeys. In addition to this, the following extract from the field notes shows how the act of taking photographs affected the data collection process over time:

The photographs not only acted as a trigger in the interview but also on the journey. The teenagers noticed more things because they were looking out for things to photograph. (Field Notes, Survey 3)

The participatory GIS framework was an effective way of engaging the young people in the project although in terms of a mixed-methods approach their participation was at the point of data generation and was therefore only partial (Young and Barrett 2001, Pain and Francis 2003). Nevertheless, the auto-photography or self-directed style of photography required from the teenagers ‘goes some way’, as Johnsen *et al.* (2008, p. 195) suggest, ‘towards challenging the unequal power relations between researcher and “researched”’ so that the teenagers did have a degree of ownership in the project. Josh thought it was ‘cool’ that they were the first people to test out the equipment and all of the teenagers were keen to see their routes and photographs in the interviews. During Survey 2 we lost Faith’s routes, photographs and texts at the downloading stage and although we still talked in the interview around the thematic issue, she was ‘well upset’ that she could not see the visual data she had collected.

Working with children in rural Bolivia, Punch (2001, p. 178) found that visual methods were ‘most useful in the initial exploratory stages of the research for the investigation of broad themes and for seeking children’s definitions of the important aspects of their lives’. We found that as little as one route, photograph or text message made a significant difference to the interview process by creating an oral catalyst (Prosser and Schwartz 1998) for most of the young people at the start of the interview. However, there were instances when the participants did

not remember taking a particular photograph or going on a particular route to or from school and some of them found it difficult to relate to the maps. In contrast to earlier studies where the photographs appear to have been more thoughtfully 'constructed' (see Newman *et al.* 2006, Ross 2007 for examples) the images produced by this cohort of teenagers have an appearance of spontaneity. This is perhaps due to the fact that the photographs were not taken with a camera but by using the camera on the mobile phone resulting in a different type of photographic data. Most of the photographs were taken 'on the move' resulting in some blurred images and in some instances in unintended shots, as Bob's photograph and text message in Figure 2 illustrate. Bob makes it clear with the text message that the caravan had 'got in the way'. However, in some instances the photographs and their corresponding texts were more difficult to interpret (Figure 3), as Josh's interview transcript reveals.

Marion: I thought you'd taken a picture of 'Luke's dad' but actually it says 'looks dead' [both laughing].

Josh: It's the tree at the back. It looks dead. I was writing really quickly, I didn't realise there was a man in the picture when I took it.

And then as Figure 4 shows, there were photographs without text messages that required further explanation.

Marion: So why did you decide to take a picture of that van?

Peter: Because I couldn't get the post office.

Marion: You wanted to take a picture of the post office but the van was in the way?

Peter: Yeah, so I took a picture of the van

This example clearly demonstrates how important it was to talk to the teenagers about their choice of photographs in order for us to analyse them. We wanted a visual record of their journeys and we hoped that their texts would help us to understand these visual images. Furthermore, the GeoBlog application provided a novel way of keeping a diary but what we hadn't envisaged was that some of the participants would have difficulty writing texts. At the start of the project Peter had said 'I'm not right good at spelling'. His messages, such as 'My hous', and 'The aly', were short, in comparison to others. But Peter cycled to school, which meant it was hard for him to text en route, especially since he liked 'riding fast' through the park. In contrast, when Scott travelled by car he had more time to text, 'it is realy cold and wet i came by cr today this is a pic of the view of [town] and the bridge and the chopiee seas', consequently his messages were much longer.



Figure 2. Blog entry: 'The caravan got in the way of my picture', Survey 4. Bob travels home on the bus.



Figure 3. Blog entry: ‘Luks ded’, Survey 2. Josh in the car on the way home.

Writing messages was also problematic for the two boys who had English as a second language; neither of them wrote texts in the first survey period. Eric had taken four photographs and he said, ‘Sometimes I don’t know what to say and sometimes I don’t know how to say [it]’. In Survey 2 Eric took four photographs and wrote two texts but Rafal had still to write a text. In Survey 3 Rafal took six photographs and wrote six messages. The following extract from the field notes explains how this transformation occurred:

Just realised that Rafal’s phone is switched onto predictive text and he doesn’t know how to switch it off. It’s no surprise that he said ‘I’m not good at writing text Miss’. It can’t be easy working with predictive text when English is not your first language. Bob showed him how to change it. (Field Notes, Survey 2)

In terms of the language the teenagers used, the majority of texts were written using a combination of English, local dialect and text speak. Some of the participants used the messages as a way to communicate with the research team starting off with ‘Hi’ and signing off with words such as ‘Bye from Sasha’. Occasionally this form of diary-keeping resulted in photographs and text



Figure 4. Blog entry of the Post Office (see text for explanation), Survey 1. Peter stops off at the corner shop on his cycle route to school.



Figure 5. Blog entry: 'Still depressed cause of my hamster's death but it's sunny i feel a-bit better', Survey 2. Vernon passes by the school buses as he begins the walk home.

messages that were unrelated as Vernon's photograph and its corresponding text message illustrate (Figure 5).

Nevertheless, the photographs that appeared to have corresponding text messages (Figure 6) were still enriched by further explanation in the interview. Bianca's description of the sound and the smell of the 'manky ginnel' provides us with her situated knowledge.

Marion: So when you walked past the 'manky ginnel'⁵ what did you feel?

Bianca: I just felt a bit relieved . . . when you're walking past it your feet make loud sounds and I just don't like walking through there . . . I don't like the flooring on it; it's just a bit weird.

Marion: So you don't feel scared when you're walking along?

Bianca: No, it's just a bit not nice. It's just not very clean and stuff and people throw food and stuff on the top bit so it all stays up there so it's all horrible. And the council don't do anything about it even though some people have rung up and said.

As Loizos (2000, p. 98) points out, images 'can help focus interviewees, free up their memories, and create a piece of shared "business" in which the researcher and the interviewee can talk



Figure 6. Blog entry: 'da manky ginnel', Survey 3. Bianca avoids walking through the passage-way on her route home.

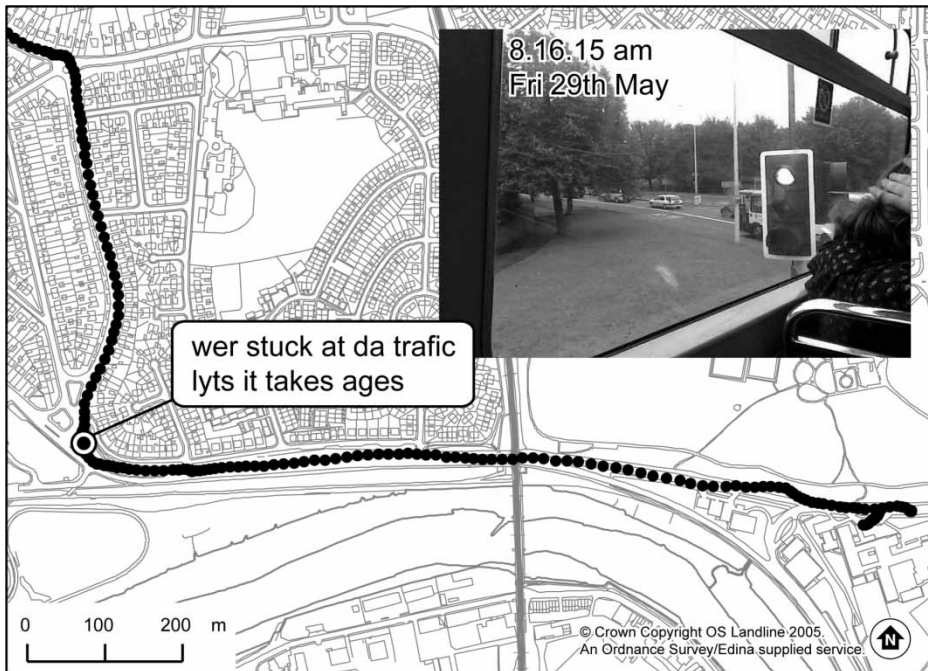


Figure 7. Representation of GeoBlog entry captured by Brook travelling on the bus to school, Survey 3.

together, perhaps in a more relaxed manner than without a stimulus'. For the first set of interviews we had a printed copy of the participant's 'best route' and looked at this and at their photographs and text messages on the laptop. However, with each successive interview our conversations became more specific about individual journeys, rather than of the journey *per se*, as we looked in detail at particular points along the route or compared one route with another. The following extract from the field notes illustrate how the enhanced visual data, through this use of GIS, helped with this progression in the interviews:

In some instances the routes helped to jog their memories but some of the young people found it difficult to read the maps. Next time it would be helpful to have the day and the time on the route. (Field Notes, Survey 2)

This time we had all of the routes and the GeoBlogs that were usable for each of the participants on the laptop. This meant that it was possible to overlay one route on top of another and this opened up discussion about variations in routes. It was also possible to view the text and then the photograph *in situ* which also helped to stimulate conversation in the interview. (Field Notes, Survey 3)

By the third interview we were talking about things that were 'absent' from the photographs and texts (Loizos 2000, p. 101), and about the routes and the 'no-go areas' that the teenagers avoided (Percy-Smith and Matthews 2001), such as the park across the road from the school. Going through the park was a short cut for some of the teenagers and several developed strategies so they could take the shortest route. Peter preferred to cycle through the park in case he met up with a group of boys he described as 'bullies' saying, 'I can cycle faster than they can run'. Bianca usually walked home through the park with her friend Claire but when Claire stayed for an after school activity rather than walk alone Bianca followed 'Tara and her love birds', a group of older pupils, saying, 'I just kind of tag along with them' (Figure 8).

For Bernard this geography of fear developed towards the end of the summer term on the school bus:



Figure 8. Blog entry: 'tara n her luv birds', Survey 2. Bianca feels safer walking home alone through the park when she tags behind these older pupils.

It was really bad with the year 11s but they've gone now ... but the year 10s and 9s are usually throwing stuff and it's a bit annoying. It depends on the bus driver if they stop it. If the bus driver gets out and says 'stop it now' then they just go 'Hail to the bus driver', and then they just start singing that and then they just start throwing stuff at you. And it's just like 'oh great'. It's like 3, 2, and in that time you have to put your bag over your head, and it's like 1 and they just start throwing stuff.

Bernard started to travel home on the public bus, to avoid the noise and the people 'lobbing food', but in the autumn term his friend, Jim said it was 'a bit calmer' and he persuaded Bernard to travel home with him on the school bus. Rafal's journey also changed in the autumn term and instead of walking or occasionally taking the bus, as he had done during Surveys 1, 2 and 3, he began cycling. Indeed changes in mode of transport occurred for some of the young people on a weekly basis and for others on a termly basis with the result that it was not possible to categorise their transport modes because they varied so much throughout the year. The following extract illustrates some of the social complexities that affected the decisions Rafal made about why, how and where he cycled during Survey Period 4:

Rafal is cycling now on his BMX bike, 'It's quicker; I can set off later. ... it takes like five ten minutes to go down'. He prefers cycling to school because it's down hill. On the way back he goes up the one-way system with the flow of traffic [unlike Eric who cycles up hill against the flow of traffic on the way home]. Rafal doesn't like wearing his helmet but the school rule is that he has to do this if he wants to leave his bike in the new secure bike shed. On Monday he went a longer route than necessary to call for his friend and they met Bob in MacDonald's and had hot chocolate. Then he gave Bob⁶ a 'piggy' to school but now they have started having hot chocolate at school. He prefers this because it's at the end of the journey so he can relax and not worry about being late because last year he got 50 late marks. (Field Notes, Survey 4)

Ethical issues: working with the teachers, the teenagers, and the technology

Working with children and young people raises a wide range of ethical issues (see Morrow and Richards 1996 for discussion). The issues that are of particular relevance to this study are the teacher input to the project, the issue of reciprocity and the safety and 'traceability' of the teenagers.

Turning first to the issue of teacher input. At the outset of the project it had been agreed that the geography teachers would not be directly involved in the recruitment process but they had asked to comment on the final choice of participants. This resulted in Miss Smith suggesting that one of the volunteers would not be able to cope because, 'his literacy skills are not up to

it'. The research team, however, did not consider limited literacy skills to be a methodological barrier (Sood 2005). Meth (2003, p. 202) suggests that using diaries, 'assumes a range of skills many interviewees do not possess' but we argue that writing text on mobile phones requires a different type of literacy skill and we were keen to include children with a range of abilities. Moreover, we were not only asking the young people to write messages but to collect routes and photographs, and as Young and Barrett (2001, p. 151) point out, 'Visual methods have been demonstrated to be a very good way of including children of all ages and both genders into the research process without discriminating between those with different abilities, confidence levels and educational attainments'.

Nevertheless, Miss Smith also felt that this particular pupil, and one other, were not to be trusted, saying 'I've taught these kids for the past two years and you will just have to trust me'. She felt that they would not behave responsibly with the equipment (each set was worth approximately £180), even though the participants knew that if they remained on the project for its duration they would be able to keep a 'high spec' phone. Although the teenagers would be collecting data outside of school hours, and off the school premises, and *they* may not have felt that they were representing the school, the reality was that they were considered to be 'school ambassadors' by the school staff during the data collection periods. Given that the head teacher was keen to foster a link with the university, since the project provided the school with an opportunity to advertise this collaboration in the local press, it was felt that we had to respect Miss Smith's advice. The two pupils flagged up as 'cause for concern' were placed in the reserve team leaving us with the possibility that we might call upon them at a later date to join the project.

Secondly, there is the issue of reciprocity. Offering to give the participants a mobile phone raises ethical issues about this form of 'payment' with the young people (Meth 2003). Although we were not specific about the quantity of photographs and texts we required our expectation was that the young people's enthusiasm would wane as the project progressed and that the amount of visual data they collected would dwindle (Chipchase 2005). However, as Table 2 shows, the quality and amount of data they collected increased and improved with each consecutive survey as they became more confident working with the kit.

During the year we worked with 36 teenagers. There is no doubt that most of them were attracted by the idea that they might get to keep a phone but some realised quickly that taking part involved effort and organisation; including giving up lunch times to attend meetings, remembering to charge the equipment and being prepared to spend time getting a GPS signal prior to the start of each journey. The highest drop out rate occurred at the end of Survey 1 with four pupils leaving the project. Jack said, 'It's too much hard work', whereas Joel said 'I've got a new phone now Miss, so I don't want to take part anymore'. Nevertheless, some volunteers had been attracted by the idea of getting a phone. Bianca said, 'I took part so my mum could send the phone to [my cousins] ... when we go on holiday my cousins, like all

Table 2. Data collection improved and increased with each consecutive survey

	Route Information				Blogs	
	Failed Attempt	Low Quality	Medium Quality	High Quality	Photos	Text messages
Week 1	102	75	58	16	87	99
Week 2	89	101	34	26	159	188
Week 3	112	90	27	21	186	197
Week 4	101	100	19	40	401	478
Total	419	402	148	111	833	962

my girly cousins, they're always moaning that they don't have a phone'. By the end of the project the majority were talking less about how much they wanted the phone and more about how much fun it had been taking part:

Marion: ... you've been very consistent and you've worked so hard, why have you stuck at it?

Louise: Well, when I start something I finish it so it's like a book, even if I find it totally boring, I still read it to the end.

Marion: So did you find this boring?

Louise: No, sorry I didn't mean that [laughing].

Marion: Well, I didn't think you did. ...the incentive for the phone has got to be there as well ...

Louise: ... sort of. It kind of was.

Marion: In the beginning?

Louise: Yeah, but then I really got into it. I don't know I just seemed to enjoy it.

Thirdly, there is the issue of personal intrusion and traceability. After each period of data collection and prior to the downloading process we reminded the participants to delete any personal data that they did not want us to see, such as personal photographs and text messages, but the methodology still provided unexpected insights into the young people's home life. For example, India did not charge her GPS and phone because 'the meter ran out' and Vernon's dad checked his phone for messages and personal data.

Before the project began we had not envisaged the ways in which the teenagers would personalise the phones with screen saver photographs of their friends and family to the extent that they became *their* phones. It became clear as the study progressed that it would have been difficult not to return the phones to the young people at the end of the project and so we encouraged each participant to achieve a little more in each subsequent survey period, whether this was to take a photograph or write a text or collect a route. For some this encouragement resulted in one or two more photographs and texts but for others it resulted in a surge of data collection in Survey 4. Rafal and Bob decided to try and take as many blogs as their friend Susannah. The drawback was that Bob produced so much data in Survey 4 (Table 3) that it was impossible to talk about all of the photographs and texts he collected in the interview but he was more enthusiastic and 'had a lot more to say' (Field Notes, Survey 4) than he had in the previous three interviews.

As we have already mentioned, the participants were in charge of the equipment at the point of data generation so that ultimately they were in control of their traceability.⁷ We began the project with 30 kits, made up of a mobile phone, a GPS unit and a phone charger. At the end of the project we still had 30 mobile phones, 29 GPS units and 29 phone chargers. This high level of return reflects the responsible attitude, commitment and trust the teenagers brought to the project by providing us with a lens through which to view their school journeys. The team, and this includes Miss Smith, wanted the project to be a positive experience for the young people. After Survey 4 we returned to school with feedback about the project with a PowerPoint presentation for the Year 9 school assembly. We presented 30⁸ participants with a phone and a certificate of achievement against a backdrop of their photographs ranging from the scenic to the artistic to the wacky.

Table 3. The number of photos and texts collected by Bob

Survey period	Photos	Texts
1	1	0
2	6	5
3	3	1
4	83	78

Conclusion

There is no doubt that having the opportunity to work with the young people over the period of a year meant that as their confidence grew and as we developed a working relationship with them that this yielded benefits to the amount and quality of the data set. The caveat here is that it was easier for those who walked or travelled by car to collect data, and it was certainly the most difficult for those who cycled. At the start of the project we found that not all of the young people were comfortable working with the GPS units and with such ‘high spec’ mobile phones, but the technology kept them engaged so that during the year they became more comfortable using the equipment on a daily basis. But there were inevitable disadvantages. The methodology was time-consuming and required a high level of co-operation between the school and the teenagers and the researcher. The methodology also produced a large amount of data which current GIS and visualisation tools are not yet equipped to manage. Nevertheless, the methodology described here, used in conjunction with data on air pollution, has the potential to be used to inform health promotion with respect to children and young people’s everyday travel.

What this paper shows is that talking with the teenagers enabled us to gain a deeper understanding of their engagement with the technologies whilst providing us with a situated knowledge to help us make sense of the data. Crucially it was the talk that helped us to unlock this technical project. The majority of the photographs gave us places the teenagers felt were ‘interesting’ and occasionally the text messages told us how they felt about those places but in most cases it was the interview that provided us with this information.

The multi-methods approach provided a research technique that captured the complexities of the school journey over time. The methodological triangulation of the three data sets i.e., the routes, the photographs and texts, and the interviews and field notes provided a means of engaging with those complexities. The methodology demonstrated more effectively than most other research on the school journey the ways in which the journey for secondary-aged pupils varied from day to day and week to week. Crucially it shows the extent to which these variations were contingent on complex personal, household and environmental factors, and that the degree to which pupil engagement with the environment (and enjoyment of the school journey) varied depending upon the mode of travel adopted.

Most importantly what this paper shows is that this mixed-methods approach was inclusive; it did not require a high level of academic skills nor did it exclude those pupils with English as a second language. The methodology enabled the young people with a range of differing skills (both academic and non-academic) to engage in the research process in different ways and their involvement provided a richness to the data set and to our understanding of the school journey as contingent and complex.

Acknowledgements

We are especially grateful to the staff at the participating school and to the teenagers involved, whose support and enthusiasm was a major component in the success of this project. Thanks also to Simon Chew, Gordon Clark, Anne Grinyer, Peter Hopkins, Anne-Marie Houghton, and Greg Myers for their help and encouragement and to Jo Armstrong who commented on an earlier draft of this paper. The project was funded by the Economic and Social Research Council (ESRC Small Research Grant RES-000-22-2023).

Notes

1. In this study we used the interface to collect a simple health survey which is not reported on further in this paper.
2. Formerly Moser.
3. A further two questionnaires were completed after the initial selection process bringing the total to 44.
4. ‘Second home’ is used here to include a regular journey to or from the home of a parent, grandparent or close relative other than the participant’s primary home.

5. North of England dialect for a narrow passageway or alley.
6. Bob does not wear a helmet when he gets a lift on Rafal's bike. The school rules state that cyclists must wear helmets but this does not include the pupils who get a 'piggy'.
7. We promised to preserve confidentiality at individual and school level in presentations and publications and to store route data on a secure server. These data have not, and will not, be placed on a data archive for general access.
8. Eric had returned to his home in Europe by this time and we sent him a phone through the post.

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