Student Research in a Web 2 World: Learning to use new Technology to Gather Primary Data

Martin Rich
Cass Business School, London, UK
M.G.Rich@city.ac.uk

Abstract: In recent years there has been rapid growth in the number of resources available to conduct scholarly research with the assistance of the Internet. While the British Library's (2009) survey revealed a reluctance among doctoral and post-doctoral researchers to engage with new technologies, masters-level students and final-year undergraduates are often much more open to technological innovation, They are familiar with interactive tools in the classroom (King and Robinson, 2009), and used to the characteristics associated with Web 2.0 (O'Reilly, 2005), but could often benefit from guidance as to how to exploit these tools in their independent work. This paper discusses four general types of tool which can be used to gather primary data in research: Electronic web-based surveys. These can be set up very simply using software such as 'Surveymonkey', Qualtrics, or the Bristol Online Surveys system developed specifically for the UK higher education sector. As a result they are popular with students, but their very ease of use often means that little attention is paid to sampling, or to interpreting the results with caution. Blogs. Again, these are easy to set up, but it is less clear to students how they can be used as a data gathering tool. However the current author has encountered a number of instances where a student has set up a blog to invite comments on a topic, and to gather opinions from readers that might contribute to the students' work. Personal response systems or 'clickers' which are available as a computer peripheral and can be used to gather data from a group of people very rapidly. Conferencing systems which could be used in effect to conduct more or less structured interviews electronically. A simple exchange of emails would be a primitive way of achieving this, and would be asynchronous, in that the interviewee does not need to respond instantly. A synchronous equivalent could be provided using chat or instant messaging software. ll four of these have the benefit of being instantly self-documenting in that any data provided is stored electronically. This is a particularly attractive attribute for masters level students, or final year undergraduates, who may be under pressure to produce some independent and original work with very limited resources. As a general observation these tools offer enhanced scope for students to carry out original and distinctive work, and to place their own stamp on their findings. If nothing else, the use of unique primary data can differentiate one student's work from that of others. But this needs to be tempered with an appreciation of the limitations of primary data and an understanding of how to use it realistically.

Keywords: Web 2; research training; primary data

1. Introduction

This paper is a response to the emergence of a number of Internet tools which can be used to gather data, and particularly to the widespread availability of these tools to university students wishing to carry out their own research. These tools typically invite participation from a number of users, a characteristic which places them within the broad category referred to as 'web 2.0' (O'Reilly, 2005). They can also be used while incurring little or no cost, and are often easy to set up for anybody with a reasonable level of familiarity with use of the world wide web.

Despite the attractiveness of these approaches to gathering data, a survey by the British Library (2009) among doctoral candidates and post-doctoral researchers revealed some reluctance to engage with these new technologies. A possible explanation is that those in the early stages of an academic career have a tendency towards risk-aversion, and therefore prefer to avoid radically new approaches to gathering data. This is consistent with the author's observation that online surveys, which take a familiar research instrument and implement it electronically, are much more widely accepted than other tools for using the world wide web in research. However, experience of working with both undergraduate and postgraduate students suggests that there is a significant group who are open to the use of web 2.0, and that opportunities exist for teaching these students how they might apply research skills to the use of new tools to gather data. Also there is a concern that these opportunities might be limited by a lack of mutual understanding between educators and students, given that students are readier than educators to use new technology to gather data.

This paper discusses a number of tools used by students to facilitate data gathering as part of their dissertation process, and reflects on students' experience of their use and the competences that these students should have. Some pointers are offered, suggesting how students can acquire these competences, which should be of interest to those concerned with teaching research methods.

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Because this analysis is based on a limited number of cases, readers should be cautious in inferring conclusions about how these tools might be used.

2. A brief review of relevant literature

This section reviews and discusses some of the background literature relating to the implementation of Web 2.0 in higher education. Barnatt (2009) draws connections between web 2.0 and the strategies that universities need to offer – he uses the term 'higher education 2.0' to refer to a new pedagogic landscape enabled by this new technology, with the lecturer adopting the role of a facilitator more than that of a broadcaster. He also draws attention to the need for universities to adapt to an approach which he terms a 'mashup mentality', where combining a set of different tools and resources becomes commonplace. However his conclusions centre on the benefits of making scholarly resources freely available and of academics reaching the largest possible audiences for their work. Kane and Fichman (2009) focus on one web 2.0 tool – the wiki – which makes particular allowances for the provision of user-generated content. They are cautious about the prospects for its use within higher education, but they do observe that information systems researchers have a tendency to stick to systems which were originally devised for a world based around paper They identify particular potential for wikis as tools to review and iteratively improve documents.

Lai and Turban (2008) take a broader view of the contribution of Web 2.0 to social networks. Many of their examples relate purely to users' social activities, but they discuss the opportunities for using similar networks to facilitate professional activities. Their model of social life on the Internet identifies tools, resources, and people as elements in an organisation based on trust.

As a counterweight to these positive views of a world defined by ever-increasing access to information, Bawden and Robinson (2009) discuss some of the dangers associated with information. They refer to the problems associated with information overload but also set out to go beyond these and identify pathologies that may result from the overprovision of information. In terms of web 2.0 they are particularly concerned with issues around contributors' loss of identity, and the impermanence of information.

3. Electronic web-based surveys

3.1 Background

These are tools which allow a user to post a simple survey on the web, and to invite responses electronically. They include features which can generate statistics and graphs based on the responses. Among the students with whom the author discussed surveys, by far the most popular was *SurveyMonkey*, a commercial service generally run according to a subscription model where researchers could pay to put up a survey. Other survey software is available, notably *Bristol online surveys* (BOS) which is oriented specifically towards higher education and was originally devised at the University of Bristol, and Qualtrics, which is a sophisticated commercial system with a significant user base in higher education. Surprisingly, students who had access to the BOS software through their university nevertheless tended to choose SurveyMonkey, seeing it as a familiar and trustworthy commercial product and often feeling that they would have less control over their work if they used BOS, given that it was a package provided by the university. This is despite the scope to confer some authority on a survey by building it using a package provided by the university, and possibly by associating it with the university's brand.

3.2 Application

Survey software proved popular among students who were keen to gather primary data as part of an essay or dissertation. In particular dissertations were perceived as an opportunity for students to direct their own autonomous learning (Todd et al, 2004) and the use of a body of data collected through such a survey could add individuality and originality to a subject. Surveys could be implemented quickly and cheaply, and the results could be collated rapidly. The web address for the survey could be publicised by sending emails, or by inviting participants in an Internet discussion forum to visit a website. Surveys constitute a familiar research instrument, and most of the students who reported using web-based surveys had attended research methods courses which discussed the use of surveys in general – usually in the context of paper-based techniques.

Several students reported a striking level of success using survey software. One student, who set out to evaluate the business models used by developers of one very specific type of Internet application, expressed considerable pessimism in the early stages about getting survey resources, and devoted some effort to formulating an alternative strategy for his dissertation should the survey approach not prove viable. In fact, by publicising the survey in the online discussion areas frequented by this group of developers, he attracted responses from a wide range of developers, and by framing open questions and allowing respondents to provide discursive answers, he elicited the type of insight that might more typically be associated with an interview. Because some issues were mentioned by several of the respondents, the results lent themselves to a thematic analysis (Thomas and Harden, 2007) through which the student placed his individual 'stamp' on the issue. While a limitation of this approach is that it does not automatically provide for data to be shared with respondents, this student undertook to share the survey results, in an anonymised form, with any respondent who provided the student with contact details.

Another student used online survey software to conduct a psychological experiment among her peers, setting out to find out about students' possible views of knowledge sharing within the workplace. This survey set out to discover how particular areas of management theory were played out among a particular community; the student had been briefed that one promising approach to a dissertation was to find out how well the established theory in a field matched the practice. Because the students' peers were part of a group (final year undergraduates) about to enter the workforce, their perceptions as reported through the survey offered pointers about how the theory might evolve in the future to match the attitudes of this generation.

At the undergraduate or taught masters degree level most students' decisions on sampling were fairly superficial; the strongest students had chosen research designs which did not depend on a particularly representative sample. Notably in the example above using application developers, the most significant insights in the discursive responses came from individuals who had an unusual and distinctive perspective and were therefore not representative of developers as a whole.

3.3 Teaching requirements

Use of online survey software requires familiarity with basic web use – something which all of the students who discussed this approach possessed – and an understanding of the uses and limitations of survey data – an issue which is traditionally covered in research methods teaching. Areas where there is scope for more guidance in the use of surveys, particularly for students who are accustomed to using Web 2.0, include:

- Being aware of the limitations of particular sampling approaches, and possibly designing research to take full advantage of the samples which could be surveyed
- Understanding the potential to use web 2.0 resources to reach the audience who could be surveyed
- Knowing how to share results with survey respondents, who may be acculturated into the web 2.0 approach where knowledge is constructed collectively, in contrast with a the approach presupposed by surveys where knowledge is merely collected by one person
- Recognising the potential for using other web tools in place of, or in tandem with, simple web surveys. This could include specialised web survey software provided by an academic institution, or software embedded in a social networking site such as Facebook

4. Blogs

4.1 Background

A 'blog' or web log, is a simple online diary that usually follows a particular format, with the most recent entry at the top of a page. Initially blogs could be dismissed as a tool for their authors to report exactly what they were doing from day to day, but a number of developments led to their broader application. The blog format proved very attractive to journalists reporting on a fast-changing sequence of events. It also evolved to allow comments on entries, and to allow links to be created between blogs, and to websites, so that blogs became a useful tool for generating ideas collaboratively. Kim (2008: 1344) observes that blogs are 'often employed by educators to overcome the weakness of current CMC [computer mediated conferencing] software'

4.2 Application

The author spoke to three students who had used blogs specifically as tools to facilitate the data gathering stage for original work carried out within an undergraduate degree. All three of these examples were in some way concerned with information and communication technology and its impact on business. One of the students saw the blog primarily as a way to record and consolidate his own ideas. In practice, this student's blog was most useful in identifying background reading for secondary research, and in articulating the student's response to some of the sources. In places, the text in the blog could be seen as a first draft in preparation for the final work, typically more descriptive and less structured than the essay that was being worked on. The blog in this case facilitated a reflective process (Schön, 1991) which was enhanced by occasional comments and questions from outsiders who were able to observe the development of the student's ideas.

The other two students used a blog more explicitly to invite comments, and to solicit ideas from readers – in the same sort of way that other students had used survey software to collect discursive results. Key differences between comments on a blog and a survey were that comments on a blog were visible to anybody, so that one commenter could build on a point made by another, and that comments could include links to other resources on the Internet. In theory, then, blogs should have been much more effective than surveys in gathering discursive data. In practice, however, these students did not attract enough visitors to their blogs to build up a critical mass of comments, and the amount of data gathered through this approach was very limited.

4.3 Teaching requirements

Students are generally aware of blogs, and familiar with browsing them, but may not realise how easy it is to set up a blog. Areas which could usefully be covered are:

- Stressing the potential for using a blog as a self-reflective tool
- Finding ways to attract worthwhile traffic to a blog which would lead to useful discussions
- Framing issues on a blog so that comments provide relevant data for the blog author
- Understanding the etiquette that should be followed if a blog is to be taken seriously by its readers.

Some useful experience relating to this particular technology came from students who had already created blogs, and were familiar both with technical aspects of setting them up, and with the challenges of creating content and inviting comments. This is an instance where these experienced students could usefully be encouraged to share their experiences with others who might wish to create a blog, especially since the concept of the 'blogosphere' depends on creating links between different blogs.

5. Personal response systems

5.1 Background

Personal response systems, or 'clickers', can be connected to a computer to allow members of an audience to vote on a question that is put in front of the audience. Although they typically have 10 or 12 buttons so can only provide a limited number of responses to a question, they do offer a very quick way of gathering data. An experienced facilitator could vary the questions answered in response to issues raised by the audience, so it is possible to introduce an element of reflection into the process. There is some experience of using these systems to encourage participation in classes in higher education (Beekes, 2006).

6. Application

Most of the students who discussed these technologies with the author had experience of using clickers in class exercises, with a member of staff acting as facilitator, and generally responded positively to these. Arrangements could be made for students to borrow the clickers, but in practice the take-up of this was very low.

There were several reasons for students' reluctance to use this technology. One was simply a fear of it proving unreliable, and a sense that university staff had access to better support and resources if the technology did not work as planned. This also deterred students from travelling with the system,

although the portability of the clickers was intended to be a benefit, in that a meeting using clickers and a laptop computer could be set up almost anywhere.

But it also became apparent that the synchronous nature of this tool – that it invited responses immediately – made it unpopular. Even students accustomed to using instant messaging and Skype in their personal lives were reluctant to gather primary data within a limited time: they had little confidence that people would turn up at a particular time outside the routine of scheduled classes. Also this technology was seen as being owned by the university in a negative manner – where the students would feel a loss of control over their own research design – and not in a constructive manner of it being a facility available for them to use.

6.1 Teaching requirements

For this technology the immediate teaching requirements should be focused on overcoming the barriers to use:

- Offering training, and perhaps mentoring, in setting up and using the systems
- Discussing in which cases there may be advantages in collecting data synchronously, and inviting responses within a limited time
- Explaining how the questions used within a clicker exercise can be modified 'on the fly' to introduce an element of immediate response and reflection into a session.

7. Conferencing systems

7.1 Background

In this context 'conferencing system' is used to refer to any system which could be used to conduct an interview of dialogue electronically. A simple exchange of email could be a way of achieving this, but there are attractions in using other approaches where the same information can be read by a number of participants. Social networking sites, of which Facebook is among the best known, achieve this by allowing users to post information which others can read or add to. Computer conferencing systems are not new, especially in an academic environment, but the evolution of web 2.0 has made them much more familiar, and made a much greater variety of formats and structures of communication available. One effect of this is that it is increasingly possible to replicate face-to-face data gathering approaches such as interviews and focus groups on the Internet, as well as to create completely new approaches. An example of a new approach made possible by the reach of the Internet is 'crowdsourcing' (Howe, 2006) where members of the public (or a 'crowd') could be invited to contribute ideas, and offered non-monetary incentives to do so.

In practice the two sites offering conferencing systems cited by students were Facebook, principally associated with social activities, and LinkedIn, which was seen as a system strongly oriented towards professional use. Both could be classed as web 2.0 sites in that they offer scope for participants to post their own material, and encourage users to participate in complex webs of connections between people.

7.2 Application

Social networks such as Facebook are very widely used by students, and it is natural that students should adopt these as a basis for computer conferencing. Both Facebook and Linkedin offer virtual spaces devoted to particular topics and interests, and students were able to initiate conversations in the spaces relevant to their own original work.

A particular benefit of LinkedIn is that members typically have a public profile including employment history, education, and skills. By having access to these public profiles, students could find out background information about the LinkedIn members who were contributing to discussions, and would be able to detect any bias among a group of contributors.

Similarly participants in Facebook identify themselves through interests, membership of groups, and so on. While this background information can be slightly more amorphous than the professional information posted on LinkedIn, it has a similar benefit in offering transparency and insight into the group of people involved.

One student used LinkedIn as a platform for a series of electronic focus groups around the theme of crowdsourcing. He gathered some valuable, and in some cases unexpected, responses, although he found that the focus groups needed rigorous moderation to keep the discussion close to the subject. Furthermore he noted that many participants in LinkedIn had a product or service of their own to sell, and would see involvement in the online discussions as an opportunity to get publicity for it. While this was a perfectly legitimate use of a service aimed at business users, the student found that participants who were focused on selling something of their own tended to be limited in their contributions to the discussion.

One student in particular reported using Facebook in tandem with an electronic survey, by publicising the survey to a community within Facebook where he expected to find some interest in his topic.

Silverman (2007) is highly critical of the excessive use of interviews as a research instrument, arguing that they introduce bias and that naturally occurring data is more authentic and thus more valuable. In some applications students use social networks, such as Facebook, in effect as platforms to conduct interviews electronically. But in other cases the use of social networks allows the researcher to inhabit a space between that associated with an interviewer, and that of an observer collecting naturally occurring data.

7.3 Teaching requirements

Because the use of conferencing systems builds on students' existing experience of using social networking systems, there is particular value here in adopting a constructivist approach where the educator's role is to steer the student through building on their own experience and ideas (Goodyear and Ellis, 2007). In this case there is value in:

- Exploiting the properties of particular social networks (the nature of the participants, the structure of the network itself, etc)
- Determining what approaches to data gathering can best be built into a particular social network
- Sharing ideas on the strengths and weaknesses of particular networks and approaches
- Developing moderation skills which students can apply to ensuring that discussions remain focused and relevant.

8. Paper, face-to-face, or electronic?

It is worth reflecting on the characteristics of different media, and what alternatives exist to the electronic tools that are discussed here. Surveys are a well-established instrument for use in student research, and are naturally well suited to being implemented using the web. The alternative would be to send out paper forms, which would introduce a considerable cost and, particularly for students with limited resources, be a deterrent to contacting potential respondents unless they were almost certain to complete the survey. So the use of electronic media offers scope to approach a large audience in the anticipation that a small proportion will respond and provide useful information.

With electronic communication some other sampling issues arise. In many cases, students are operating in a worldwide environment when they are using the Internet. This can be valuable and appropriate: for example the student who interviewed Facebook application developers came across respondents in several different countries, all of whom were dealing with an international market, and who encountered broadly the same issues, irrespective of what country they were in. But on other occasions this can be problematic; it can be hard to limit the recipients of surveys to people in one country or one region, and sometimes misunderstandings can arise simply because it is not apparent to respondents where the questioner is.

Additionally there are issues of accuracy around sampling with electronic surveys. Some electronic survey tools do provide facilities to trace and isolate multiple responses from the same computer, and comparable suspicious behaviour such as an excessive number of identical responses. Nevertheless the results obtained through an electronic survey which is widely circulated should be treated with considerable caution, and students need to acknowledge the limitations of data when they generalise from it.

In other cases, such as the use of social networks to conduct discursive conversations with subjects, electronic tools can be regarded as alternatives to face-to-face conversation. In such circumstances

these tools offer possibilities which in the past were simply not available, to hold a complex and nuanced conversation with somebody who has not the time or the flexibility to visit the student conducting the research. However the dialogue remains qualitatively different from that which would take place in a face-to-face setting, with no possibilities for observing body language for example. So discussions conducted electronically have a distinct 'flavour' that students can usefully recognise and adapt to.

Dearstyne (2007) discusses web 2.0 tools from the viewpoint of an information management practitioner. In his analysis one of the primary characteristics of web 2.0 tools is encapsulated in the term 'workstyle' which he uses to indicate the way that knowledge workers share their contributions and build on one another's work. There is an apparent paradox in that the examples discussed in this paper relate mostly to students' individual work. But by using web 2.0 tools to gather primary data, students have the opportunity to build creatively and innovatively on information that has been provided to them by others, and to use some of the benefits of being connected to a larger group. This is arguably most apparent in the case of the student who used crowdsourcing as a theme. While the conclusions and frameworks presented within this student's work were original, and the student's intellectual contribution to these was never in any doubt, they were constructed to some extent using ideas and concepts that had originated with other people who assisted with the project.

9. Pedagogic issues

Because the tools discussed here can be used by students to create original and distinctive knowledge, they are consistent with trends that have emerged over the years towards learning that is constructivist, in that it encourages students to contribute their own thoughts and ideas actively to the learning process, and student centred.

The self-documenting nature of discussions that take place using social networking websites offers scope for discourse analysis using tools such as the language/action perspective (Winograd, 1987). Such analysis could provide a deeper understanding of students' research and learning processes, and potentially form the basis for students to reflect on their own approaches to gathering data.

Ramsden (2003:87) in a discussion encompassing the nature of good university teaching, and the difference between 'deep' and 'surface' learning, identifies a 'commitment to encouraging student independence' as one of the characteristics associated with effective teaching in higher education. The electronic tools discussed here do offer significant practical support for students to work independently in a manner that can yield valuable results.

10. Concluding remarks

From this small-scale inquiry it appears that each of the electronic techniques discussed imposes a different set of requirements for teaching research methods. There are some common themes, however; it is important to build on students' existing experience but also to encourage the use of new tools. There are potential benefits from using a variety of tools, and there are benefits in being prepared to use facilities offered by a university, such as some of the online survey and personal response systems.

Knowledge management (Grossman, 2007) has emerged since the mid-1990s as a significant academic area within business and management. Students who are carrying out independent work need to practise effective knowledge management, recognising that knowledge is complex, is constructed over time, and has a tacit dimension. Using the tools described offers students an opportunity to gather original data rapidly and to build valuable connections between primary data and their own ideas. An important benefit is that electronic tools are usually self-documenting: for example web survey software can produce reports automatically, and discussions that take place using computer conferencing are instantly documented.

A significant concern is that students tend to rely excessively on data that is easy to collect, rather than data which can usefully be analysed, and there is a danger that the use of electronic tools can exacerbate this, by making it tempting to gather superficial data. Bryman and Bell (2007) offer extensive advice, pitched at a level appropriate to students carrying out an independent piece of work, on how to conduct a survey. Much of this is relevant to students using Internet tools to gather data, but it needs to be tempered with a considerable awareness of the limitations of these approaches.

It is also important that educators encourage students to use a variety of tools, and to explore unfamiliar approaches; discomfort with a particular tool among staff can be a significant barrier to its use, and can be in contrast to students' familiarity with it (King and Robinson, 2009). All these approaches offer scope for students to produce independent and original work with limited resources, and it would be a pity if students were constrained only by excessive caution among their teachers.

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