Online or on paper: An examination of the differences in response and respondents to a survey administered in two modes.

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Abstract

The internet has revolutionised the way we live in the 21st century and to some extent has impacted on the way we do survey research. The facility to survey online allows for considerable savings in printing, mailout costs, data entry or scanning hardware. Concerns, however, about the use of the internet to survey include selection bias, response bias and response rates.

In 2003 Murdoch University carried out a satisfaction survey of all students. Initial contact was via email asking students to respond online. Follow-ups of non-respondents used the more traditional mailout/paper format. A response rate of fifty percent was achieved with sixty-three percent of responses coming via the online mode. This paper looks at the issues of selection bias and response bias. What kind of students respond online? Are they are different from those responding via the paper forms? It also compares responses provided online, including open questions, with those on paper and questions whether the paper questionnaire is dead or dying with online surveys the way of the future.

Introduction

Over the last decade the internet and electronic communications have impacted increasingly on the daily lives of individuals. In 2000, one third of Australian households had internet access[1]. Australian Bureau of Statistics (2004) figures indicate that in 2003, 66 percent of households had access to a computer (up from 61 percent in 2002) and 53 percent had access to the internet, a rise of 7 percent from the previous year. Additionally the number of internet access lines had risen by 13 percent in the six month period from September 2003 to March 2004. Since the advent of the internet, researchers have made use of both the web and email to conduct survey research. A Google search on the 'online survey research' now provides 4,680,000 hits.

Much of the literature on conducting online surveys is concerned with issues relating to sampling error, does putting the survey on the web restrict access to a biased group (Dillman, 2000; Sheehan, 2002)? Surveys conducted on students who all have access to the internet, however, avoid this bias but have encountered the problem of low response rates (Ballantyne, 2003; Cody, 1999; Dommeyer & others, 2002; Dommeyer

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[1] Source – The West Australian, 25th August, 2000

& others, 2004; Hmieleski; 2000; Hmieleski & Champagne, 2000). Notification of an online survey usually comes initially via email. Accurate email addresses are often difficult to obtain, even for a student population and emails not seen as relevant to the receiver are often trashed as 'spam'. Sheehan (2002) reports a sevenfold increase in unsolicited emails between 2000 and 2002 and indications are that spam continues to be a problem.

Advantages of using an online system include cost and speed of response (Bothell & Henderson 2003; Dommeyer & others, 2004; Shrager, 2001). Savings in costs are found from lower mailing costs and the absence of a need to have data entered. Caution is advised when considering the cost savings. Hidden costs with online surveys include the need to maintain a reliable website and ensuring the accuracy of email addresses of the survey population (Blackstrom & Nilsson, 2003; Yun & Trumbo, 2000). Better data quality may be found with online surveys; fields can be made 'required' thus avoiding missing data in key variables, a single response option can be forced, there are no unreadable comments which cannot be used and data entry mistakes are avoided (Cummings & Ballantyne, 1999). Open-ended comments in surveys provide a rich source of data not otherwise collected. Online surveys have been found to be particularly good sources of open ended responses (Hardy, 2003; Muffo, Sinclair & Robson, 2003; Shrager, 2001). Schaefer and Dillman (1998) report a fourfold increase in open comments with online surveys. At Brigham Young University where all student evaluations have gone online, states on its website that –
> *Research shows that when forms are completed online, the number, length, and thoughtfulness of student comments are greatly increased. Research at BYU and across the nation has shown that students are much more likely to supply written comments when ratings are online* (Brigham Young University).

Given these advantages and disadvantages of online surveys, many researchers have opted for a mixed-mode or hybrid administration where respondents may answer by paper or electronic methods. However, if data is collected by different methods, will this bias responses? A number of studies have considered this, but conclusions reached are mixed. Hybrid surveys vary in the way they are administered. Yun and Trumbo (2000) sent a paper form, an email survey and a hyperlink to the web to all respondents giving them a choice of mode of response. They found no variation according to response mode and felt a more representative sample was achieved by using mixed methods. Several studies of online student evaluations have found no difference in responses between paper and online submissions (Carini & others, 2003; Hardy, 2003; Johnson, 2003; McGhee & Lovell, 2003). Other studies of mixed-mode surveys, however, have found differences by response mode (Blackstrom & Nilsson, 2003; Muffo, Sinclair & Robson, 2003; Parackal, 2000).

Universities in Australia are increasingly expected to produce evidence of student satisfaction with their learning environment. Student surveys of teaching and units are commonplace, all graduates are surveyed nationally using the Graduate Destination Survey (GDS) and Course Experience Questionnaire (CEQ) and surveys of student satisfaction with their overall experience are increasing. Within the current context the cost savings attributed to surveying online are particularly attractive but low online response rates and poor student email contact details makes the mixed-mode survey a more reliable option. This paper describes a survey undertaken at Murdoch University in 2003 of all students, in which both web and paper responses were possible. It

considers whether there are differences in the students who respond in each mode and whether there are differences in how they respond with particular emphasis on the open-ended comments section of the questionnaire.

The Student Satisfaction Survey[2]

At the beginning of 2003 Murdoch University instituted a whole of university Student Satisfaction Survey. The purpose of this survey was to collect information, not currently available from other sources, on the overall student experience. Murdoch has a long tradition of caring for its students. Results in the national Course Experience Questionnaire, completed by graduates four months after graduation, have consistently shown that Murdoch courses rate highly in terms of good teaching. The university's internal Student Surveys of Units have shown over several years that more than eighty percent of students are satisfied with the quality of the units they are studying (Murdoch, 2000). Unit and teaching quality are however, not the only aspects of the learning environment which contribute to a student's overall university experience. There was, therefore, a need to put in place a process which would collect information on the level of student satisfaction with other elements relating to the their university experience. The Student Satisfaction Survey was designed to do this.

The survey sought information on course issues, such as the options available for students with different learning styles, the helpfulness of staff and the amount of encouragement students receive to take responsibility for their own learning. Murdoch has recently reviewed its Graduate Attributes and invested considerably in a graduate attribute mapping tool to provide assistance to staff to ensure graduate attributes are embedded in courses. Information on the student perception of their opportunities to develop these skills was collected in this survey. Universities spend considerable amounts of money each year on the services they provide to students and on the buildings and physical environment of the campuses. Students were asked to rate their satisfaction with each service and indicate how important that service was to them.

Murdoch University has adopted a policy of electronic transmission as the default mode of communication between students and the university, All students at the university are provided with a student email address and students who do not wish or are unable to use electronic means of communication are required to make a special request for paper communication. In this context, the practice of initiating a survey online then following up non-responders with a paper mailout provides for optimum use of resources. This mixed-mode approach has been used at Murdoch a number of times in the past. The Student Satisfaction Survey, however, provided a large cohort of students which allowed a comparison of the two modes.

The survey population included all students enrolled at local campuses (i.e. not students who are studying at offshore campuses) or externally in Murdoch University degrees, other than postgraduate research degrees. Students were initially informed of the survey by an email message directing them to the online form. Those who did not submit their form online within two weeks were sent a paper questionnaire. In addition, these students were provided with the online questionnaire URL. A further paper questionnaire reminder was sent three weeks later. The survey population consisted of 9044 students and 4626 responses were received giving a response rate of 51 percent. Sixty-three percent of responses (2905 students) were received online. Demographically the survey sample was similar to the student population. Groups

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[2] This survey is available on the web at http://www.tlc.murdoch.edu.au/survey/student.html

over-represented by between two and four percent were females, fulltime students, Australian students and undergraduates. It is intended that this survey will be administered biennially.

The Survey Sample – Online and Paper Differences

When Murdoch first started using online surveys in 1998 it was considered that three criteria were required before deciding whether the population were suitable for an online survey. These were –
- level of access of participants to information technology,
- lowest level of computer literacy of participants and
- level of acceptance by participants of undertaking online task

(Ballantyne, 2000). While this is now less of a consideration, there is still a perception that online participation will be biased towards certain groups. Chi-square tests were undertaken on the demographics of the paper and online respondents. Table 1 shows those areas where significant differences ($p < 0.05$) were found between the two groups. Findings are what might be expected. Male students, younger students, undergraduates and full-time students were more likely to respond online. Overseas students use electronic communication to correspond with family and friends and student accommodation, used by a high percentage of overseas students, has internet connections in each room. While no differences were found across the three Divisions of the university, Arts, Science and Engineering, and Health Sciences, Murdoch has

Table 1
Comparison of online and paper respondents

Sex	n	Online	Paper
Male	1604	68.7%	31.3%
Female	3022	59.6%	40.4%
Age			
School leaver	1717	64.4%	35.6%
Mature age	2909	61.8%	38.2%
Level of Study			
Undergraduate	4261	63.5%	36.5%
Postgraduate	365	53.7%	46.3%
Residency			
Australian	4099	60.7%	39.3%
Overseas	527	78.4%	21.6%
Attendance			
Full-time	2041	64.3%	35.7%
Part-time	2582	61.5%	38.5%

twenty Schools of study representing more discrete discipline areas. Unsurprisingly the School of Information Technology reported the highest use of the online form (78

percent) with the School of Education showing the lowest (51 percent). There were no differences relating to the campus students attended, whether they were on or off-campus students and whether they were in their first or subsequent year of study.

While differences in the groups were not a problem as the combination of paper and online forms delivered a representative sample, the issue of sampling error remains a consideration if the university were to move to an online only survey.

Comments

The open comments section of a questionnaire is often a rich information which enhances the quantitative data. It also provides respondents with an opportunity to comment on issues which are important to them but which may have been omitted from the survey. As this was a survey of a large population, open-ended questions were kept to a minimum. Students were asked three questions at the end of the questionnaire. These were –

- What do you like best about being a student at Murdoch University?
- What is most needing improvement at Murdoch?
- Any other comments?

Given the theory, based on previously cited work, that online comments tend to be more numerous and more prolific than paper, a simple analysis using Microsoft Word word count tool was undertaken. Table 2 provides a quantitative breakdown of the qualitative responses from the survey. For the purpose of the analysis if a comment was defined as a response to any of the questions above. Students, therefore were able to make a maximum of three comments.

Unlike the studies previously cited, the percentage of respondents making comments in this survey was smaller in the online group. Interestingly, however, the comments received online when measured in words per comment, characters per comment and lines per comment, students who responded online were more prolific. Whether the quality of the online comments is exceeds that of the paper comments requires a more in-depth analysis.

Some of these differences may be explained by the differing demographics of the two groups and more testing is required to investigate this. Table 3 indicates that there are few significant differences in the mean number of comments each made on the appropriate demographic areas. Only sex and residency status are significantly different. However while the difference in mean number of comments between male and female is small, there were almost twice as many female students in the sample as male students, and females were less likely to respond online. T-tests were undertaken on each of the groups where a difference was found in Table 3 to discover whether differences in the number of comments made by each group existed according to response mode. Table 4 details the mean number of comments made by each sub-group according to the response mode. For each group the mean number of comments was higher for the paper mode than for the online. It would appear that the theory that more students make online comments does not hold but that the comments are more prolific does.

Table 2
Analysis of quantity of comments, comparison of paper and online responses.

Comment	Online n=2903	Paper n=1723
What do you like best about being a student at Murdoch University?		
No. of students commenting	1953	1323
Percentage of students commenting	67%	77%
No. of words per comment	16.41	11.69
No. of characters per comment	81.76	62.68
No. of lines per comment	1.57	1.31
What is most needing improvement at Murdoch?		
No. of students commenting	1938	1274
Percentage of students commenting	67%	74%
No. of words per comment	31.36	19.07
No. of characters per comment	152.60	96.69
No. of lines per comment	2.50	1.74
Any other comments?		
No. of students commenting	964	556
Percentage of students commenting	33%	32%
No. of words per comment	34.81	21.05
No. of characters per comment	162.94	101.54
No. of lines per comment	2.63	1.80

Table 3
Mean number of comments made – comparison by demographics
(all response modes)

Sex *	Male	1.67	Female	1.78
Age	School-leaver	1.71	Mature-age	1.78
Residence *	Australian	1.76	Overseas	1.57
Level	Undergraduate	1.73	Postgraduate	1.84
Attendance	Full-time	1.77	Part-time	1.72

* Differences are statistically significant at $p<0.05$

Table 4
Mean number of comments made by response mode

Sex	Online n=2903	Paper n=1723
Male *	1.63	1.75
Female *	1.72	1.88
Residence		
Australian *	1.71	1.84
Overseas *	1.51	1.79
Total *	1.84	1.68

* Differences are statistically significant at $p<0.05$

Discussion

Despite the increased use of the internet and the emphasis for students on electronic communication, differences still exist in the profile of online and paper respondents which make the decision to move to online only surveys somewhat premature. In the interim, however, mixed-mode surveys are the preferred option, providing the cost savings (approximately $3000 saved in data entry costs alone for this survey) of online with the overall coverage of the population which still requires a paper backup. This study did not examine differences in quantitative responses between the two groups, an issue on which the literature is divided, but did agree with previous findings that comments made online tend to be more prolific.

The question as to whether the paper survey is dead and online is the way forward remains. As more and more everyday tasks are undertaken electronically, the online survey becomes the more acceptable way to respond. Students now rarely handwrite assignments and the coming Millennial generation will have expectations of increased use of technology beyond what we now expect. Ultimately, it would seem that the paper survey will die but when is impossible to predict. Meanwhile it is important that research into online, paper and mixed-mode methods continues.

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