

Open access theses in institutional repositories: an exploratory study of the perceptions of doctoral students

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Introduction. We examine doctoral students' awareness of and attitudes to open access forms of publication. Levels of awareness of open access and the concept of institutional repositories, publishing behaviour and perceptions of benefits and risks of open access publishing were explored. Method. Qualitative and quantitative data were collected through interviews with eight doctoral students enrolled in a range of disciplines in a New Zealand university and a self-completion Web survey of 251 students.

Analysis. Interview data were analysed thematically, then evaluated against a theoretical framework. The interview data were then used to inform the design of the survey tool. Survey responses were analysed as a single set, then by discipline using SurveyMonkey's online toolkit and Excel.

Results. While awareness of open access and repository archiving is still low, the majority of interview and survey respondents were found to be supportive of the concept of open access. The perceived benefits of enhanced exposure and potential for sharing outweigh the perceived risks. The majority of respondents were supportive of an existing mandatory thesis submission policy.

Conclusions. Low levels of awareness of the university repository remains an issue, and could be addressed by further investigating the effectiveness of different communication channels for promotion.

Introduction and research objectives

In most New Zealand universities, institutional repository archiving is not compulsory for academics but is often mandatory for doctoral and/or masters students. The University of Auckland and Massey University for instance, have implemented mandatory deposit of theses for all doctoral students enrolled since 1 January 2007. On one hand, open access to postgraduate theses is exciting, as student authors can disseminate their research to a wide audience and may be cited more easily by researchers in their academic community. On the other, open access archiving may raise concerns over copyright, plagiarism and premature publication of findings.

Studies focusing on the attitudes of academic staff have been conducted in New Zealand and overseas, but very few studies have been conducted into the attitudes of postgraduate students toward these new models of scholarly publishing. No studies on student perceptions of repository archiving or open access publishing have been conducted in New Zealand, as reflected in the current body of literature.

This study attempts to uncover underlying attitudes of a sample of New Zealand doctoral students toward open access publishing and repository archiving in journals and repositories and their attitudes toward the mandatory submission of their theses to their university's repository. Investigating how and from whom awareness, perceptions and attitudes towards these modes of publishing arise is an important facet of the project. Gaining insight into these issues has the potential to contribute to efforts aimed at raising awareness of the benefits of open access and promoting repositories in different disciplines.

It is anticipated that an understanding of the attitudes of doctoral students toward open archiving of theses and a better understanding of their research and publishing behaviour could assist university library staff in developing repository submission policies and processes that suit students and in doing so, encourage student collaboration in the ongoing development of repository collections.

The main research question of this study is: What attitudes and perceptions do postgraduate students hold in relation to the potential significance, benefit and risk of archiving their doctoral theses in an open access institutional repository? The research addresses the main question through the following sub-questions:

1. To what extent are students aware of repositories and open access in the context of scholarly publishing?
2. Do students use documents archived in repositories, open journals and open monographs in their own thesis research?
3. Do students from different disciplines have different perceptions of open access publishing and repository archiving?
4. How and from whom have existing perceptions of repositories and open access publishing been formed?
5. Are students willing to comply with mandatory repository submission policies?

The research questions also attempt to address a broader issue: What can institutions do to improve awareness of the role of the institutional repository, address risks or potentially negative aspects of repository archiving and encourage the ongoing use and consistent deposit of doctoral theses in the future?

Literature review

According to Suber (2007), open access literature (of all types) is '*digital, online, free of charge and free of most copyright restrictions*', allowing readers to download, print, distribute and even create derivative works, as long as attribution is acknowledged. Publication and distribution costs are not paid by the reader and are therefore not a barrier to access. According to the Bethesda Statement (2003), *open access* allows for unrestricted derivative use (e.g., translation, or including an excerpt in another publication), whereas *free access* may not necessarily allow this (MacCallum 2007). It is important to note also that open access publishing is compatible with established processes of

copyright, peer review, revenue (even profit), print, preservation, prestige, career-advancement, indexing and other features and supportive services associated with conventional scholarly literature (Suber 2007).

In terms of a definition of open access in relation to institutional repositories, the Bethesda Statement also states that an open access publication is one that is 'deposited immediately on publication in at least one online repository that is supported by an academic institution, scholarly society, government agency or other well established organization that seeks to enable open access, unrestricted distribution.' (Bethesda Statement... publishing 2003)

The role and purpose of institutional repositories

A reoccurring theme within the literature is how to define an institutional repository and its role in the scholarly communication process (Xia and Sun 2007). Lynch's working definition is often cited as it is broad enough to encompass a large number of roles within an institution: '*A set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members*' (Lynch 2003).

In a widely-cited SPARC (Scholarly Publication and Academic Resources Coalition) paper on institutional repositories, Crow (2002) explains the potential of open access repositories. For Crow, repositories have the potential to create a *positive paradigm shift* in the processes of scholarly communication in two ways: first, the potential to provide a complement to existing modes of publication and stimulate changes to the current

model of scholarly publishing (particularly mitigating the increasing cost of accessing scholarly publishing); and second, the ability to 'make visible' the research outputs of individual institutions in order to 'demonstrate the ... relevance of its research activities' and increase the 'visibility, status and public value' of the institution ([Crow 2002: 4](#)).

Repository use and content recruitment

Almost all authors writing about repository archiving report problems in encouraging author participation and use. Davis and Connolly's evaluation ([2007](#)) found the Cornell University repository to be under-populated and under-used by academic staff. Key reasons for non-use included preference for existing alternatives to repositories, a perception that repositories were redundant, technical difficulties, concern that their work may be plagiarised, concern regarding quality and status of the repository, and confusion over copyright. Foster and Gibbons's ([2005](#)) research into understanding faculty in order to improve repository content recruitment found the majority of researchers did not perceive the repository to be relevant to their needs, nor perceive any potential benefit from using the repository. Apprehension towards repository deposit (and open access publishing in general) seems to centre around three key issues: lack of motivation to self-archive; concerns surrounding intellectual property, copyright and plagiarism; and negative attitudes toward open access publication and archiving as legitimate modes of academic communication.

Mandatory deposit policies have been adopted by many institutions to boost repository content and create a sustainable, accessible collection of research outputs ([Sale 2006](#)). These policies may apply to specific types of research output, to academic staff outputs, or to postgraduate theses. While mandates take time to be embedded in staff work processes ([Sale 2006](#)), they have been shown to be an effective way to achieve growth and guarantee the sustainability of repository collections. However, other repository developers propose that mandates damage goodwill toward the repository as an integral service and that staff buy-in is more important to sustainability than any guarantee of regular submissions of content ([Palmer et al. 2008](#)).

Benefits and risks

The principle and intended benefits of open access publishing and archiving do receive widespread support among the majority of academic authors ([Kingsley 2008](#); [Pickton and McKnight 2006](#)). Archiving allows for greater exposure of a work (e.g., through Google Scholar), thus a greater potential for research impact ([Cullen and Chawner 2009a](#); [Kingsley 2008](#)). Increased exposure is partly achieved by increasing readership through the inclusion of researchers who would not normally have access to subscription journals ([Kingsley 2008](#)). In addition, archiving allows research outputs to be preserved in digital form, making them easier to retrieve in preparation for funding or promotion rounds ([Performance-Based Research Fund Sector Reference Group n.d.](#)).

Within the literature, academics are reported to be concerned about the same set of risks or barriers associated with repository deposit. Authors' concern over the ability to publish if a pre-print of an article (or a thesis) is already available in an institutional repository is often mentioned. Confusion and concern over copyright, provenance and quality control, particularly the risk of copyright infringement or plagiarism, is also a recurring theme in the literature ([Cullen and Chawner 2009a](#); [Davis and Connolly 2007](#); [Gadd et al. 2007](#); [Pickton and McKnight 2006](#); [White 2008](#)). The 2007 comparison of two JISC surveys ([Gadd et al.](#)) concludes with the notion that there is no single copyright solution for repository archiving, due to the diverse types of research outputs held (e.g., data sets, teaching materials, grey literature, theses, pre- and post-prints and publisher's PDF files).

Disciplinary differences

Academic disciplines differ in their processes of research, publication, recognition and reward. In the literature, different disciplines are described as having differing attitudes to repositories and open access publication, depending on the fit between existing publishing channels and the new options offered by open access. In relation to the humanities disciplines, Cheverie et al. ([2009: 220](#)) describe an entrenched culture of '*professional prejudice against digital scholarship*'. Researchers (and their students), particularly those in monograph-based publishing cultures, perceive that archiving or publishing in an open access journal may damage their future careers ([Cheverie et al. 2009](#); [Jöttkandt and Hall 2007](#); [Pickton and McKnight 2006](#)).

Attitudes toward open access differ dramatically in the sciences, where speed of publication and communication of results is of paramount importance. Researchers in the sciences have more readily

embraced open access in the form of peer-reviewed open journals (e.g., [PloS: Public Library of Science](#)) and the publication of pre-prints in subject-based repositories such as [arXiv](#). For a researcher in a fast-moving discipline such as computer science, archiving a work in a repository is similar to existing research and scholarly communication processes ([Kingsley 2008](#)).

Disciplinary differences appear to extend to the next generation of researchers. Pickton and McKnight's ([2006](#)) study of graduate students at Loughborough University found science students to be more willing to comply with mandatory submission of their theses to the university repository than their fellow students in the humanities. Both aversion to and embrace of open access appear to be socially constructed within the disciplines in accordance with their existing publishing norms ([Cheverie et al. 2009](#); [Duranceau 2008](#); [Kingsley 2008](#)).

E-theses

Despite their value as original research, master and doctoral theses have traditionally been considered grey literature, due to their physical inaccessibility ([Jones and Andrew 2005](#)). In addition to boosting repository statistics, the inclusion of electronic theses in repositories allows original research undertaken by emerging scholars to be visible, accessible and able to be used by the wider research community. Statistics indicate that theses that are made available in this way are more widely used and cited in ongoing research ([Troman et al. 2007](#)).

Postgraduate student work in institutional repositories

Few studies focus specifically on the role of student work in repositories. Two papers by Pickton and McKnight ([2006](#); [2007](#)) focus on the perceptions and needs of postgraduate students. Their 2006 paper found the majority of students to be enthusiastic about making their theses and other research outputs available through repositories. Support for the *principle* of open access was found to be a major motivating factor. However, students were found to hold many of the same concerns around open access and archiving as academic staff, particularly regarding plagiarism, quality and hindering later publication in journals ([Pickton and McKnight 2006](#)). The second paper considers the inclusion of student work in repositories from the perspective of repository managers. Through responses from thirty-five institutions, it was found that repository managers '*overwhelmingly believe that there is a place for research student output*' ([Pickton and McKnight 2007](#): 158-159) but that many believed the work to be deposited must meet certain criteria to ensure quality control. Some repository managers indicated that they were attempting to address lack of awareness of repositories by including information about the repository in postgraduate research skills training.

Theoretical framework

In the current research, two theories were used to model students' perceptions of open access publishing and repository archiving. The first, Rogers's diffusion of innovations theory was used to model students' awareness and use of open access resources in their own research. The second, social exchange theory was used to model students' attitudes toward the perceived costs or benefits of sharing their thesis work with the wider community through an institutional repository.

Diffusion of innovations theory

Rogers's diffusion of innovation theory provides a conceptual framework for explaining how and why innovations (defined as new tools, processes or ideas) come to be adopted by certain groups. According to Kingsley's ([2008](#)) recent work mapping Rogers's theory to empirical findings from qualitative interviews with academic staff, institutional repositories perfectly represent Rogers's concept of an innovation as '*an idea, practice or object that is perceived as new by an individual or other unit of adoption*' ([Rogers 1995](#): 11).

The term *diffusion* relates to the planned and/or spontaneous spread of innovation through a process of communication, defined by Rogers as '*the process by which an innovation is communicated through certain channels over time among members of a social system*' ([Rogers 1995](#): 5). The alignment of the innovation with the existing social structure plays a vital role in the process of diffusion and normative behaviour in a culture or community can be a barrier to change. According to Rogers, the adoption of an innovation depends on the following characteristics:

- **Relative advantage:** an innovation is more likely to be adopted if it is perceived to be more advantageous than the ideas or processes it supersedes;

- **Compatibility:** an innovation is more likely to be adopted if perceived by the adopters to be consistent with existing values and norms;
- **Complexity:** an innovation is more likely to be adopted if it is perceived to be easy to understand and use;
- **Trialability:** an innovation is more likely to be adopted if it can be experimented with during the process of adoption;
- **Observability:** an innovation is more likely to be adopted (or at least experimented with) if it is visible, or being seen to be used within a particular community.

So, then, as an innovation, institutional repositories will be more likely to be adopted by doctoral students if it is perceived to be advantageous to place work in repository collections and if repositories are consistent with existing publishing and research practice, easy to use, known and easy to access.

Social exchange theory

Homans (1958) and Thibaut and Kelley (1959) put forward related theories explaining social behaviour as a process of exchange between two or more individuals within a community who are in a position to influence each other. Social exchange theorists propose that individuals engage in social exchange, that is, the sharing of knowledge and other social goods for four key reasons:

- anticipated reciprocity,
- expected gains in reputation and influence on others,
- feelings of altruism and/or perceptions of self-efficacy and self-worth,
- direct reward (social, professional/career, or financial).

Studies in the related field of knowledge management successfully utilise social exchange theory in order to explain open information sharing behaviour in professional environments (Kankanhalli *et al.* 2005; McLure-Wasko and Faraj 2005). Social exchange theory suggests that individuals are motivated to interact or share social goods (in this case, information and knowledge) with one another based on an expectation that doing so will lead to a return or reward, particularly approval, enhanced status or respect (McLure-Wasko & Faraj 2005: 39).

In the academic environment, then, authors could be more inclined to participate in the repository archiving process if they perceive that it may lead to a social or professional reward in the form of increased readership, research impact and citation rates, feelings of altruism toward the research community and public, enhanced status, peer respect or career advancement or promotion.

Research design

This research uses a mixed-methods approach consisting of two stages: qualitative semi-structured interviews, followed by a quantitative self-completion questionnaire. The semi-structured interviews explored possible perceptions and attitudes to open access publishing and archiving and how these perceptions were formed. The data collected in the interviews formed the basis of a quantitative survey in an attempt to expand on and test the interview data to see whether perceptions revealed in the interviews were consistent among a larger sample of doctoral students. The study utilises a *sequential exploratory design* (Cresswell *et al.* 2003: 225), the purpose of which is to use quantitative data to test, consolidate and assist in the interpretation of the qualitative findings.

Population

Massey University was chosen as a sample population as it is one of the two universities in New Zealand that have implemented mandatory deposit of theses for all doctoral students enrolled since 1 January 2007. It also has an established doctoral programme, spreading over three campuses in the North Island (Albany, Manawatu and Wellington). Massey University teaches across five colleges: Science, Humanities and Social Sciences, Education, Creative Arts and Business, allowing the researchers access to students in a wide range of disciplines.

There were 901 doctoral students enrolled at Massey University as of October 2009 and 382 of these had enrolled since 1 January 2007. Table 1 provides a breakdown by discipline.

Doctoral enrolments by college

College of Business	126
College of Creative Arts	9
College of Education	44
College of Humanities and Social Science	229
College of Science	494
Total	901

Table 1: Current doctoral enrolments by college (Source: Massey University Graduate Research School)

Data collection and sampling

Interviews

The interview stage involved a purposive sample of eight doctoral students enrolled at the time of data collection across the colleges and disciplines. Two students from each of the Colleges of Business, Humanities and Social Sciences, Education and Sciences were interviewed. Students of the College of Creative Arts were omitted from the interview stage of the project due to the small population of doctoral students. All eight interviews were digitally recorded. Data were collected by direct transcription of the interview audio recording and hand-written notes taken during the interviews.

Self-completion questionnaire

The second stage of the study was administered via a Web-delivered self-completion questionnaire, with questions drawn from the findings of the interview data and from the research literature, particularly the results of Pickton and McKnight's (2006) study of graduate students and the postal survey instrument used by Cullen and Chawner (2009a). [Survey Monkey](#) was used to build and deliver the survey. A Web survey was used to reduce the cost of the survey process and increase the speed of data collation and analysis (Bryman 2004).

Data analysis

Interview data

NVivo 8 was used to sort, store and analyse the interview transcripts by theme. The interview transcripts were analysed using a grounded theory approach as described in Bryman (2008) and Charmaz (2001; 2006) which allows key concepts, themes and theories to emerge through the systematic collection, analysis, comparison and interpretation of data.

The two-phase approach to coding described in Charmaz (2006) and outlined in Bryman (2008) was used. An initial intensive, line-by-line approach was used to analyse the first few interviews and build a bank of themes and through comparing the codes and themes of the first few interviews, guide further data collection and coding. In the later *focused coding* phase, the most frequently occurring themes were retained, while many of the peripheral themes were either merged or dropped altogether (Charmaz 2006).

The interview data were also mapped against criteria from the theoretical framework. This additional coding was intended as a further aid to interpretation of the interview data. The codes, themes and extracts of text from the analysed data were then used to inform the design and wording of the fixed-choice questions in the Web survey.

Survey data

The survey statistics were analysed using Survey Monkey's online data analysis tools and Microsoft Excel. The survey responses were analysed as a single data set, then by discipline. This was done to investigate the relationships between discipline and:

- awareness of institutional repositories and open access publishing,
- adoption of institutional repositories and open access in students' research practices,
- perceptions of benefit,
- perceptions of risk,
- willingness to comply with mandates and deposit their theses in the university institutional repository.

Use of theoretical framework in data analyses

Roger's five characteristics of innovation were used in conjunction with the four key motivations for participation of Social Exchange Theory to frame the interview questions and survey instrument and as an aid to the interpretation of the qualitative data. Students were asked about their awareness and use of institutional repositories in their own research practices (observability, complexity and trialability); whether they thought institutional repositories and open access were advantageous, convenient or useful when compared with traditional models of publication and information retrieval (relative advantage, reciprocity, perceptions of altruism or self-efficacy); and whether they thought depositing work in repositories would benefit or harm their research career (compatibility and relative advantage, reciprocity, gains in influence, reward).

Findings

Response rates and demographics

Interview participants

The interview participants were a purposive sample of eight currently enrolled doctoral students, with two from each of the colleges of Business, Education, Sciences and Humanities and Social Sciences. Three students were enrolled prior to 2007, while five were enrolled after 1 January 2007 and thus were obliged to deposit their theses under the mandatory submission policy.

Survey respondents

From a population of 901 enrolled doctoral students (as at October 2009), 251 took part in the survey, with a 91% completion rate (a response rate of 28%). Of these respondents, 33 (14.5%) had enrolled before 2007 and 194 (85.5%) had enrolled since 1 January 2007 and were thus covered by the mandatory submission policy. 109 of the respondents were male (43%) and 142 were female (57%). 49 respondents held an academic position and 13 held a general staff position at Massey University. The breakdown of respondents by college (broad discipline) was uneven (see Figure 1), with the largest group of respondents coming from the College of Sciences (48.6% of respondents). However, when college enrolment figures are taken into consideration, the response from each college was fairly even, with response rates ranging between 25% (College of Sciences) and 34% (College of Business).

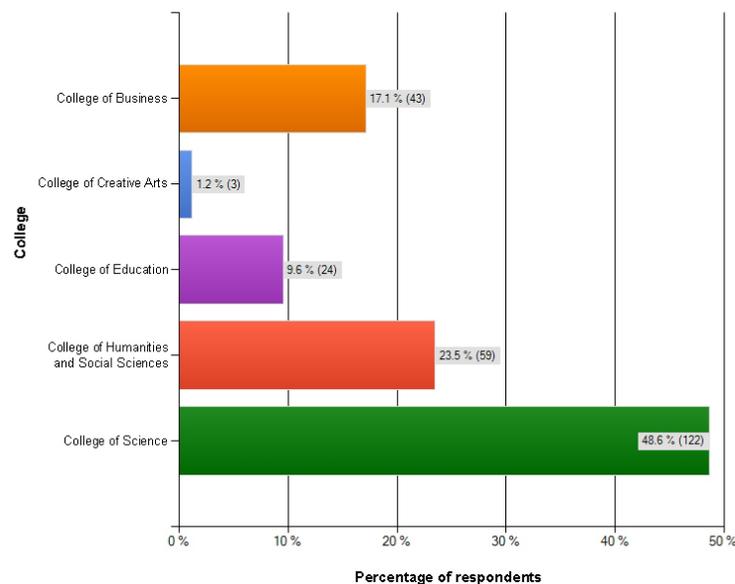


Figure 1: Survey respondents by college

Awareness of the concept of open access

Only two of the eight interview participants (both from College of Sciences) could describe the concept of open access. Among the survey respondents, perceived level of awareness appeared relatively high, with 62% (152) of respondents indicating that they were aware of the concept of open access prior to beginning the survey. However, there could be a bias in this data: participation in the survey was voluntary and those

who responded to the survey on open access and repositories are more likely to be interested in and aware of, open access than those who did not. In addition, the interview responses show that *awareness* does not necessarily indicate an *understanding* of open access. Levels of awareness (as summarised in Figure 2) were highest among respondents from the College of Sciences with 72.3% (86) indicating that they were aware of the concept of open access.

This higher level of awareness among the science interviewees and survey respondents is unsurprising considering the existence of subject-based repositories operating in the scientific community such as *arXiv* and *Cogprints* (Swan and Brown 2005).

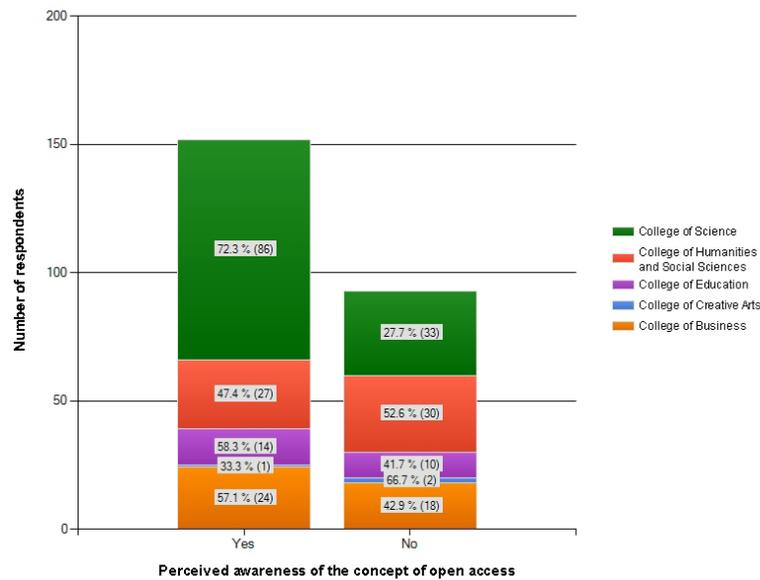


Figure 2: Perceived awareness of the concept of open access

Support for the concept of open access

Consistent among the responses from interviewees and survey respondents was support for the concept of open access, the importance of making research available to the wider public and removing cost as a barrier to accessing research. One interview participant from the College of Sciences mentioned that she had heard that open journals were not as prestigious as other journals, but would continue to use them and publish in them because she preferred the *concept* of open access journals to traditional proprietary journals.

In the survey data, 86.3% (195) of respondents either agreed or strongly agreed with the following statement on the benefit of open access: *Open access is important because it removes cost as a barrier to accessing research and allows public access to research and information.*

The desire to widen public access to information and the importance of altruism should not be underestimated and are evident in other studies in the literature. In Cullen and Chawner's (2009b) recent survey of New Zealand academic staff, altruistic intent in making work available to the public was established as one of the '*chief reasons*' for making work available open access. Swan and Brown (2004) found the principle of free, open access for all readers to be an important reason for publishing in open access journals. Similarly, postgraduate participants in Pickton and McKnight's study felt that the principle of open access was 'an important motivating factor' for the deposit of theses (2006). So, the concept of open and equitable access is supported by the majority of authors, which will be useful to bear in mind when marketing repositories to doctoral students (and academic staff).

Awareness of institutional repositories and Massey Research Online

Six of the eight interviewees were aware of the concept of an institutional repository and five were aware of the existence of an institutional repository at Massey University. Those who were aware of the institutional repository at Massey University (Massey Research Online) had found out about it through Graduate Research School communications.

Two students mentioned that they had found out about repositories and Massey Research Online through the Library, one through a recent Knowledge Management in Research course for staff and postgraduates.

The other had found out through a research consultation with a library staff member.

Less than half of the survey respondents (48%; 117) indicated that they were aware of the concept of a repository, while 52% (127) were aware of the existence of Massey Research Online.

While levels of awareness of the existence of the repository were high among the interviewees, deeper knowledge of the concept of the repository and what it is for or can do were lacking. Even when interviewees knew about the concept and existence of the repository, their knowledge of repositories and the way they worked was vague. For example, the majority of interviewees were not aware that material in repositories is indexed by Google Scholar, making repositories a powerful tool for disseminating their research.

Low levels of awareness (normally falling between 45-55% of respondents) of repositories *despite* marketing and advocacy campaigns is consistently referred to in the institutional repository literature (Abri zah 2009; Davis and Connolly 2007; Watson 2007). This lack of awareness of institutional repositories indicates that alternative approaches to promotion are needed if doctoral students are to be made aware of repositories and their role in making their research available to a global audience through Google Scholar.

Use of repositories and Massey Research Online

Only 17.6% (43) of survey respondents had lodged a piece of work in an institutional repository and 70.5% (31) of those had deposited their master's thesis. Only one interviewee had lodged work in an institutional repository and only two interviewees mentioned that they used institutional repositories directly in order to access research. Seven of the eight interviewees indicated that they accessed Massey research and/or theses through Google Scholar or the Massey Library catalogue, but were not necessarily aware that they were using the university's repository in the process. One student said that he did not use repositories as his research needs were met by libraries and the Internet. However, it is likely that many of the articles the interviewees had accessed using Google Scholar (and Google) were in fact held in repository collections, or were articles published in open access journals.

Among the survey respondents, 51.2% (125) indicated that they had accessed a repository. The Massey Library catalogue was the most common mode of accessing content in the repositories at 77% (97 respondents), while 69.8% (88 respondents) indicated they had used Google Scholar (see Figure 3). ETHOS (22.2%; 28), Australasian Digital Theses (19.8%; 25) and direct access (31.7%; 40) were also noted modes of access. Only 3.2% (4) of survey respondents who indicated they had used an institutional repository had used the Kiwi Research Information Service.

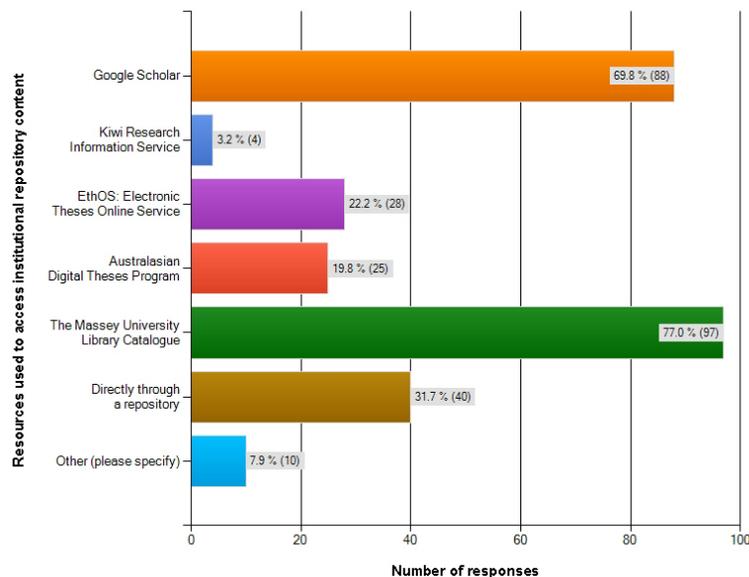


Figure 3: Modes of accessing institutional repositories to find research

The primary reason for non-use of repositories was lack of awareness, with 61.3% of the 119 survey respondents who had not used institutional repositories to access research choosing the option 'I didn't know about institutional repositories' (see Figure 4). Additionally, 26.9% (32) of respondents who answered this question indicated that they did not think that repositories were necessary for their research. This

perception is documented elsewhere in the literature among academic staff, who feel that their research and publication needs are met by existing processes of publication and libraries' journal subscriptions (Davis and Connolly 2007; Foster and Gibbons 2005).

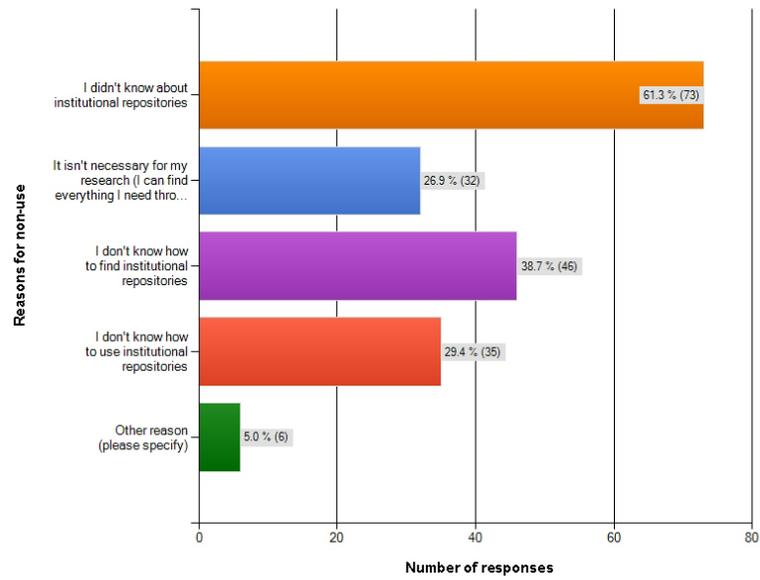


Figure 4: Reasons for not using institutional repositories

Institutional repositories and the literature search process

All interviewees said that they used a wide range of online catalogues and article databases to find information for the literature review stage of their research. However, one resource stood out as the most frequently used resource: Google Scholar, with 91.8% (224) of respondents indicating that they used it during the literature review process.

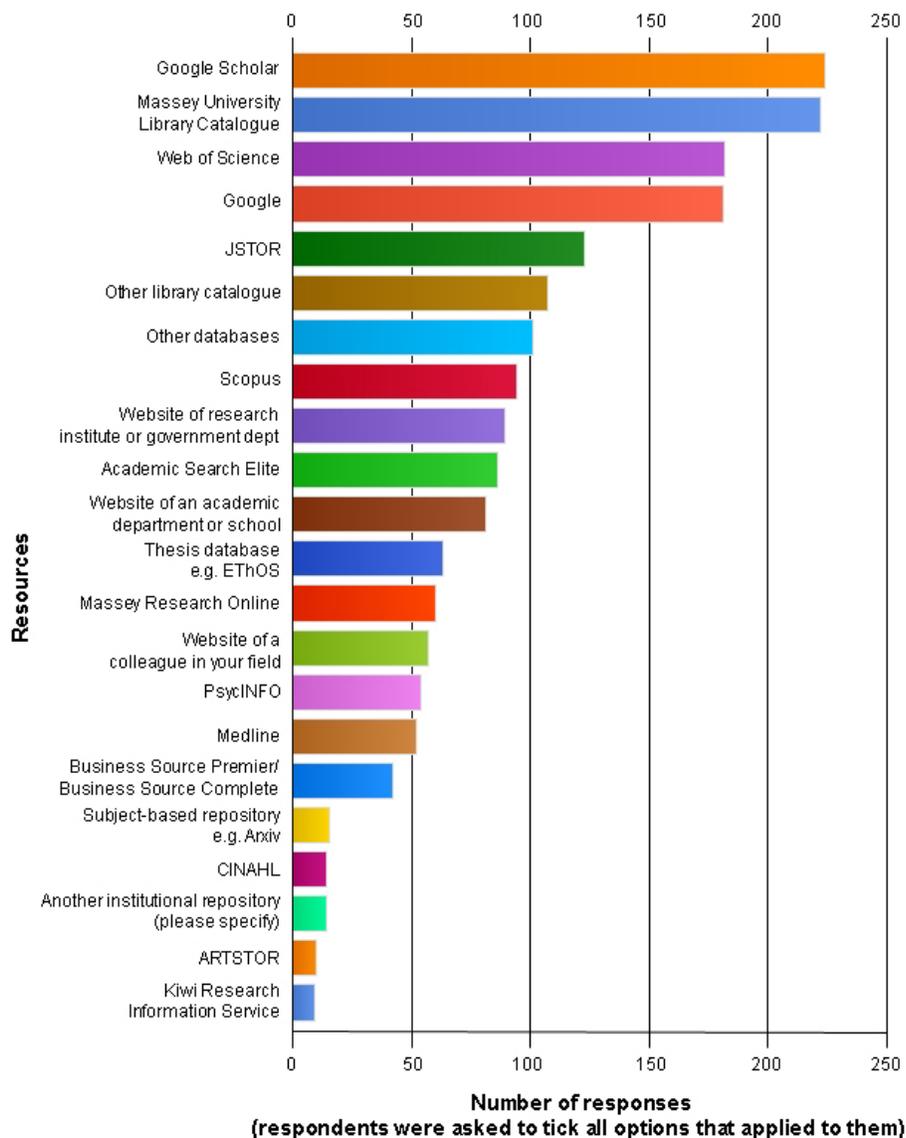


Figure 5: Sources used to conduct literature review

However, only one interviewee (from the College of Sciences) was aware that material in Massey Research Online and other repositories appears in Google Scholar. None of the other interviewees were aware of this despite indicating that they used Google Scholar.

Use of institutional repositories within the research and literature review processes (as opposed to the author deposit) is seldom mentioned in the institutional repository literature. Studies (including this one) tend to focus on rates of deposit and author willingness to deposit (Davis and Connolly 2007; Foster and Gibbons 2005) or on compliance with mandates (Sale 2006). That is, they focus on the role of the author as the producer of research, rather than on users as consumers of research (measured by downloads or rates of use). However, as all researchers are both producers and consumers of research, it is interesting to note that approximately half of survey respondents had used repositories to access research, but only 31% of these students had used the repository directly. As respondents were most likely to access an institutional repository indirectly, optimising the integration (and interoperability) with existing research services and tools is important to ensure university repository collections are visible on the Web.

In addition, it is important to note the role of Google Scholar and library catalogues when marketing an institutional repository to students or academic staff. Almost all interviewees and survey respondents indicated that they use these two tools. If students are aware that repository content appears in Google Scholar and in library catalogues, it is likely that they will be more motivated to archive their work.

Perceived benefits and risks

Perceived benefits

The perceived benefits of institutional repository and open access publishing most frequently mentioned by the interviewees were enhanced access via Google Scholar, providing public access to their work and increasing the speed of information dissemination. Opportunities for networking and participation in the scholarly community were also mentioned as benefits of archiving a thesis in a repository:

...when I put my masters on there it was a real sense of accomplishment and contributing to the field and it actually makes you feel like um, you belong to a certain community... So you know then it takes away that just a student kind of feeling... [College of Humanities and Social Sciences Doctoral Candidate]

Survey respondents either agreed or strongly agreed with the majority of benefits listed in the survey. In particular, 52.9% (119) strongly agreed and 33.8% (76) agreed that removing cost as a barrier to access is a benefit. Opportunities for professional networking, feedback, exposure on Google Scholar and the ability to share work with students, other researchers and the public were all perceived to be benefits of repository archiving (see Table 2). As the benefits listed in the survey were drawn from the literature and interview data, results reflect benefits already reported in the literature, particularly the public benefit of open access, enhanced exposure of work through Google Scholar and the potential for increased citation, and the potential to receive feedback and commentary (Cullen and Chawner 2009a; Kingsley 2008; Pickton and McKnight 2006).

Perceived benefits associated with publishing in an institutional repository							
Answer options	Strongly agree (Yes, this is a benefit)	Agree	Neutral	Disagree	Strongly disagree (No, this is not a benefit)	Rating average	Response count
I can share my work with the public more easily	35.5% (81)	43% (98)	16.7% (38)	3.9% (9)	0.9% (2)	1.92	228
I can share my work with other students more easily	38.9% (88)	47.3% (107)	11.5% (26)	0.9% (2)	1.3% (3)	1.78	226
I can share my work with my peers and the research community	37% (84)	45.8% (104)	15.4% (35)	0.9% (2)	0.9% (2)	1.83	227
It will give my work more exposure	27.4% (62)	51.3% (116)	18.1% (41)	1.8% (4)	1.3% (3)	1.98	226
It will increase the number of times my work is cited	18.1% (41)	34.1% (77)	41.2% (93)	5.8% (13)	0.9% (2)	2.37	226
My work will be available on Google Scholar	22.8% (52)	39% (89)	36.8% (84)	0.9% (2)	0.4% (1)	2.17	228
My work will be available on research websites like KRIS	15.1% (34)	28.9% (65)	52.9% (119)	1.3% (3)	1.8% (4)	2.46	225
I can get feedback and commentary on my research	22.2% (50)	45.3% (102)	25.8% (58)	4.0% (9)	2.7% (6)	2.20	225
I can publish my research findings more quickly	20.1% (45)	40.6% (91)	33.5% (75)	3.1% (7)	2.7% (6)	2.28	224
I can rely on the university to preserve a digital copy of my research in the long term	33.9% (77)	40.1% (91)	20.3% (46)	3.5% (8)	2.2% (5)	2.00	227
Open access is important because it removes cost as a barrier to accessing research (and allows public access to research and information)	52.9% (119)	33.8% (76)	11.1% (25)	1.3% (3)	0.9% (2)	1.64	225

Other academics in my field can find my work and contact me (professional networking)	36.2% (81)	50.4% (113)	11.6% (26)	1.3% (3)	0.4% (1)	1.79	224
It will enhance the research profile of my university	22.6% (51)	45.6% (103)	27.9% (63)	2.2% (5)	1.8% (4)	2.15	226
It will enhance my own research profile	26.2% (59)	46.2% (104)	24.4% (55)	2.2% (5)	0.9% (2)	2.05	225
It will help me keep track of my research (for CV or PBRF)	23.6% (53)	36.4% (82)	31.6% (71)	5.8% (13)	2.7% (6)	2.28	225
Answered question: 228							
Skipped question: 23							

Table 2: Perceived benefits associated with publishing in an institutional repository

Perceived risks

The perceived risks described by the interview participants included the potential conflict of interest with journal publishers, concerns around plagiarism (particularly in relation to theses) and a perception that open access was less prestigious than traditional forms of publication. Two interviewees expressed concern over opening themselves up to criticism by placing their thesis work in the public domain.

Survey respondents had similar concerns, but overall, results were more balanced, with the majority of responses falling in the neutral category, indicating uncertainty or ambivalence to the presented risks (see Table 3). The two risks that caused the most concern included the copying or use of work without permission and plagiarism. Conflict of interest with journal publishers and issues over copyright restrictions were also noted.

Confusion regarding journal publishers' copyright restrictions and concern that work may be plagiarised or used without permission are frequently mentioned in the wider literature ([Cullen and Chawner 2009a](#); [Davis and Connolly 2007](#); [Gadd et al. 2007](#); [Pickton and McKnight 2006](#); [Watson 2007](#); [White 2008](#)). Most frequently mentioned is author concern over the conflict of interest with journal publishers and the effect of archiving on an author's ability to publish if the pre-print (or in this case, a whole thesis) is openly available. These issues are unlikely to ever be fully resolved in a short term, due to the wide variety of permissions and restrictions associated with different journal publishers. With the help of online directories such as [SHERPA Romeo](#), library liaison staff and/or repository administrators are in a position to advise on problems around electronic copyright and publishers' permissions, as part of their liaison and outreach services.

Perceived risks associated with publishing in an institutional repository							
Answer options	Strongly agree (Yes, this is a risk)	Agree	Neutral	Disagree	Strongly disagree (No, this is not a risk)	Rating average	Response count
There may be a conflict of interest with journal publishers	17.8% (40)	37.8% (85)	38.7% (87)	4.4% (10)	1.3% (3)	2.34	225
If I publish my work in an institutional repository I may not be able to publish elsewhere due to copyright or other restrictions	22.9% (52)	36.6% (83)	37% (84)	2.6% (6)	0.9% (2)	2.22	227
People may copy or use my work without permission	24.1% (55)	38.6% (88)	25.5% (59)	10.1% (23)	1.3% (3)	2.26	228
My work may be plagiarised	24.2% (55)	34.4% (78)	28.2% (64)	11.5% (26)	1.8% (4)	2.32	227
I am concerned about confidentiality concerning the participants' information	11.1% (25)	21.7% (49)	39.4% (89)	21.2% (48)	6.6% (15)	2.91	226
I am concerned about confidentiality concerning the	8.4% (19)	24.0% (54)	38.2% (86)	24.4% (55)	4.9% (11)	2.93	225

researcher's details							
I am concerned that the research in an institutional repository is not perceived to be as prestigious when compared to print journals or books	19.6% (44)	32% (72)	34.7% (78)	12% (27)	1.8% (4)	2.44	225
I am concerned that the research published open access is not perceived to be as prestigious when compared to print journals or books	17.9% (40)	29.6% (66)	32.3% (72)	17% (38)	3.1% (7)	2.58	223
People will not be able to find my work	6.8% (15)	15.8% (35)	43.7% (97)	28.4% (63)	5.4% (12)	3.10	222
My work will not be cited	7.6% (17)	18.2% (41)	42.2% (95)	28% (63)	4% (9)	3.03	225
I am concerned about the long-term preservation of my work	9.4% (21)	14.3% (32)	37.2% (83)	32.7% (73)	6.3% (14)	3.12	223
My thesis might not be good enough to put in the public domain (on the web)	6.6% (15)	14.2% (32)	31.9% (72)	34.5% (78)	12.8% (29)	3.33	226
Publishing my thesis open access will allow people to criticise my work	6.3% (14)	26.7% (59)	33% (73)	26.7% (59)	7.2% (16)	3.02	221
<i>Answered question: 229</i>							
<i>Skipped question: 22</i>							

Table 3: Perceived risks associated with publishing in an institutional repository

Influences on publishing behaviour

Interviewees mentioned a variety of influences on where and how they would publish their doctoral research. Other than their own opinion, supervisors were identified as a major influence, while colleagues, tutors, departmental guidelines and publishing by invitation were also mentioned.

Most survey respondents (79.5%; 189) chose *agree* or *strongly agree* when presented with the following statement: *I publish where my supervisors recommend I publish*. While repository deposit is not the same as peer-reviewed publication, this result indicates that respondents may be influenced if, for example, a supervisor recommended they deposit their thesis in a repository. This finding is consistent with the results of Pickton and McKnight's study (2006), in which students were found to be willing to be encouraged by supervisors and their departments to deposit their work. Therefore, it is important for library staff and/or repository administrators to work with supervisors and academic staff when communicating the electronic thesis submission processes.

Willingness to comply with mandatory submission policies

Of the five students covered by the mandatory submission policy, all were willing to comply and submit a copy of their thesis to the repository. Of the other three, all said that they would voluntarily place a copy of their thesis in the repository upon completion. Some of the interviewees were particularly supportive:

you know you've invested four years, or longer, so I think um really you owe it to yourself to put it out there... [College of Humanities and Social Sciences Doctoral Candidate]

However, two of the eight interviewees expressed some concern over the mandatory submission policy. While supportive of placing their work in the repository and happy to comply, these interviewees expressed preference for the voluntary submission of their theses:

I think it should be optional I don't think it should be mandatory... It's a piece of work that is personal to the student and I don't think that the student should be forced to share that work with the research community if for some reason they don't think it should be. [Humanities and Social Sciences Doctoral Candidate]

Among the survey respondents, 77.3% (177) either agreed or strongly agreed with the following statement: *Except in the case of an embargo, all doctoral theses should be made openly available online through an institutional repository* (see Figure 6). Many survey respondents commented on this particular statement.

Comments varied widely: some comments indicated strong support for the statement and the concept of open access:

The NZ tax-payer paid for most of the inputs to the research (university staff and facilities) so should have free access to the work.

Open knowledge is very important, not only for the sake of my thesis but for the sake of the society as a whole.

I think it's fantastic to be able to access theses online. It may mean someone actually reads it!

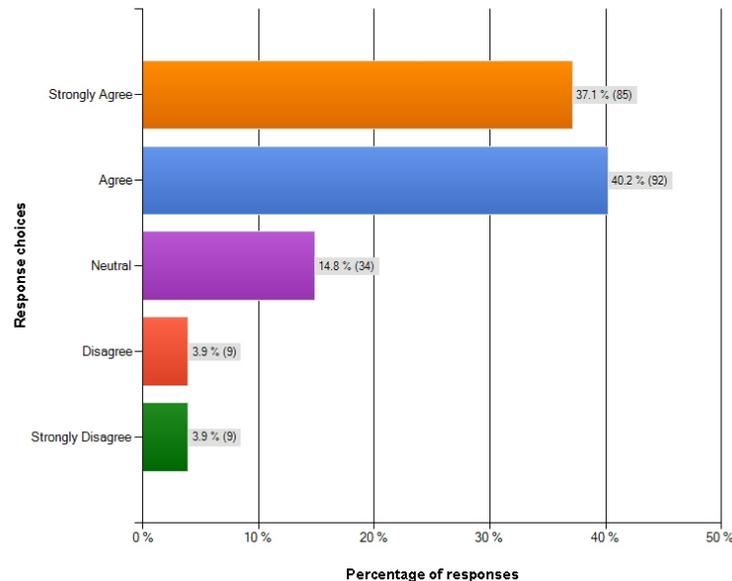


Figure 6: Opinion on making theses available online and open access

Please indicate whether you agree with the following statement: *Except in the case of an embargo, all doctoral theses should be made openly available through an institutional repository.*

Some respondents expressed preference for a voluntary system or were ambivalent toward archiving their work in an institutional repository:

shouldn't be made compulsory though

I believe it should be the choice of the student to publish their thesis in that format.

Keeping in view the benefits and risks of institutional repository, I am neutral on this question.

Some students were opposed to archiving their work in a repository:

I feel that it should be the choice of the individual student. I am concerned about plagerism [sic] by having it online and strongly oppose having my research published electronically.

Of the 33 survey respondents who were enrolled before 2007, 83.3% (25) indicated that they would voluntarily place a copy of their thesis in Massey Research Online. Of the 194 respondents who were enrolled after 1 January 2007 (and are thus covered by the mandatory submission policy), 92.6% (176) indicated that they will willingly comply with the mandatory submission policy. Only 7.4% (14) of respondents indicated that they would not be willing to comply.

Within the literature, opinion is divided regarding the necessity for (or wisdom of) mandatory submission policies for student and staff research output. Some stakeholders argue that mandates could do more harm than good in relation to depositor buy-in, preferring a library liaison and advocacy approach, while others (including some of the academics themselves) are unconcerned by mandatory deposit policies (Palmer *et al.* 2008). Other authors argue that mandates are 'the only way' to achieve appropriate submission rates (Sale 2006).

The results of this study indicate that the mandatory submission policy is widely accepted by the survey respondents and should remain in place as a key strategy for increasing the visibility of the research output of the university. This result is consistent with the findings of research by Pickton and McKnight (2007) and Swan and Brown (2005), in which the majority of students and academics (respectively) were found to be willing to comply with a mandatory deposit policy.

Disciplinary differences

From the disciplinary differences described in the literature, it would be expected that students from different colleges would have widely differing levels of awareness of open access and repositories, and different attitudes toward the respective benefits and risks associated with repository publishing. For example, Cheverie *et al.* (2009) describe an '*entrenched culture of professional prejudice against digital scholarship*' and report among academics in the humanities, for instance, a perception that archiving or publishing in an open access journal may harm their careers (Cheverie *et al.* 2009; Jöttkandt and Hall 2007; Palmer *et al.* 2008), while in some scientific disciplines, researchers describe a culture that embraces open access repositories as a normal part of the scholarly communication process (Kingsley 2008). Pickton and McKnight's study of graduate students at Loughborough University (2006) found that science students were more willing to comply with mandatory submission of their theses to the university repository than their fellow students in the humanities.

Among the survey respondents, awareness of the concept of open access was highest among the College of Science candidates, at 72.3% (see Figure 7) and awareness of the concept of a repository was highest among the College of Education and College of Business respondents at 58.3% and 53.7% respectively. In addition, awareness of Massey Research Online was highest among College of Education and College of Business respondents, at 66.7% and 64.3%.

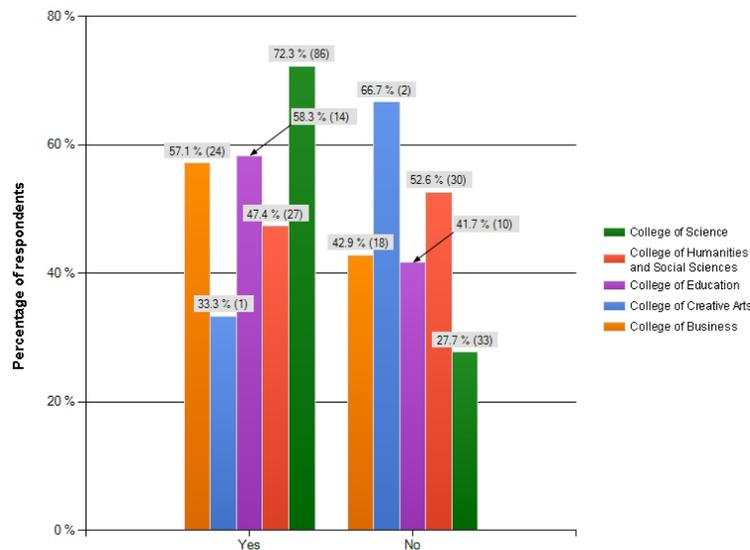


Figure 7: Awareness of the concept of open access (by college)

Prior to reading the definitions above, were you aware of the concept of Open Access as it relates to scholarly (academic) publishing?

Respondents from the College of Humanities and Social Sciences were found to be the least frequent users of repositories, with 39.3% indicating that they had never used repositories to find research (see Figure 8). However, there was less of a difference between the response profiles of the different disciplines than expected, given the differences in research and publication cultures described by researchers working with academic staff populations (Jöttkandt and Hall 2007; Kingsley 2008).

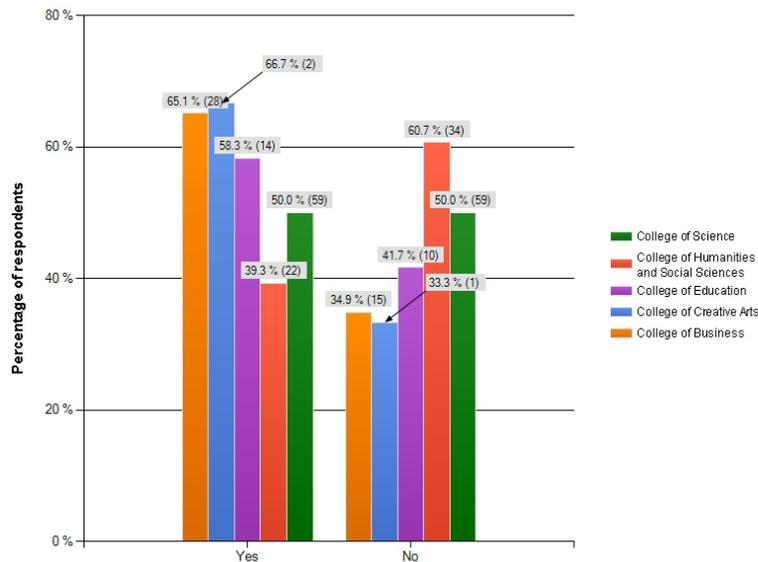


Figure 8: Use of institutional repositories for research (by college)

Have you ever accessed a repository to find your own research, a colleague's research or to look for other research?

There was a high level of willingness to comply with the mandatory thesis deposit policy. Positive responses ranged between 91.6% from respondents in the College of Science to 100% in the College of Creative Arts.

While there are some differences between the colleges, the differences found in this study were certainly less marked than those previously discussed in the literature. This result may be specific to this doctoral population, or may represent a growing acceptance of open access and/or Internet-based resources within the research and scholarly communication process.

Interpretation of the data in relation to the theoretical framework

The theoretical framework was used as an aid in the development of the interview guide and survey instrument. In addition to a grounded theory approach to coding and analysis, the interview data were concurrently coded against the categories of the theoretical framework as an alternative aid to interpretation. Codes regarding awareness and use were mapped against Rogers's diffusion of innovations criteria, to determine the extent to which institutional repositories can be considered an effective innovation. The data were also mapped against the four criteria of social exchange theory in an attempt to determine the extent to which the practices and processes of publication and scholarly communication operate as a kind of social exchange or transaction within the world of academia. While the majority of codes did not easily fit the assigned criteria, a few key themes and observations emerged through this process.

Observability, trialability, complexity

Levels of awareness (*observability*) among the survey respondents of open access, repositories and Massey Research Online hovered around the 50-60% mark. In addition, there was confusion among all interviewees as to the role and purpose of an institutional repository. In terms of complexity, one of the interviewees found the technology frustrating to use and did not feel that they had the time to spend learning to use it:

*I found when I did have a bit of a look through you know sort of the possibilities I didn't find it (the repository) particularly easy to... it's just like ah, I can't waste time on this.
[College of Business Doctoral Candidate]*

This observation is consistent with existing usability (*trialability and complexity*) issues in a study by Lindahl and Foster (as cited in Bevan 2007) in which DSpace failed usability tests (Massey Research Online is a DSpace installation). In this case, complexity is likely to be a barrier to accessing and using repositories directly, but not a barrier to accessing repository content through Google Scholar or library catalogues which have been found to be widely used by the respondents. This result highlights the importance of optimising repository metadata for discoverability through existing research portals and search engines

such as Google Scholar, the Kiwi Research Information Service and the Australasian Digital Theses.

Relative advantage

An innovation is more likely to be adopted if it is perceived to be more advantageous than the ideas or processes it supersedes (Rogers 1995). Most interviewees were unaware of one of the primary advantages of repository archiving: work deposited in a repository is indexed by and thus available through Google Scholar. Once aware of this fact, the interviewees were very positive about the advantages of placing an electronic copy of their thesis in a repository, in addition to placing their thesis in a physical library collection:

Oh yeah, well there's wider access, so it's almost global access isn't it, if Google Scholar is in there so yeah, so as far as new material reaching as many people as possible, then definitely very positive (motivation). [College of Sciences Doctoral Candidate]

One student was also aware of the relative benefits of open access journal publication, particularly in terms of the speed of publication and providing public access to research:

One of them just really... he likes the speed of it and, he's got some cash (research funding) in a fund or whatever that he can access so he's not worried about the cost of it so yeah he's really the speed and the concept of people being able to read it openly... and can get hold of it [College of Sciences Doctoral Candidate]

Gains in influence, direct reward

Interviewees indicated that they did not expect direct reward from the open access archiving of their theses. However, interviewees expressed that they thought their work would be more likely to be cited or read if placed in a repository which was perceived to be a benefit.

Reciprocity

Interviewees indicated that they wanted to be able to find other students' work online, share their findings with the community and contribute to the wider research community. The fact that the majority of survey respondents favour mandatory submission could be an indication that they expect to share their own work with the research community and use other students' thesis work within their own research. Among the survey respondents, 95% wanted to see other students' doctoral theses in institutional repositories.

Altruism and self-efficacy

This is demonstrated in the form of sharing the research with fellow students, the public and research community was the most frequently mentioned motivating factor identified within the interview transcripts:

I like that, you know, students could access it, or high school students if they wanted to, or even just the lay person who is interested in science but isn't a scientist, you know there's a lot of people out there who I think that are interested in a lot of things that feel like they can't access information because they're not in the know. [College of Sciences Doctoral Candidate]

Within the doctoral community, the process of conducting research and publication can be considered a form of social exchange. From the results, it appears that students are motivated to share their work and they expect to access other students' work during their own research. Students also expect to benefit from sharing their work, particularly from increased exposure and potential to build professional networks, and by boosting their confidence with feelings of altruism and self-efficacy; feeling they are making a contribution to their research community and public knowledge.

As an innovation, repositories operate as an effective means to share doctoral work and have clear advantages over the traditional publication format of theses in print. As an innovation, repositories allow researchers to push their research to the international research community as never before and appear to have widespread support among the doctoral student community at Massey University. However, the diffusion of institutional repositories throughout the academic community is still at a relatively early stage. There is some way to go before there is widespread awareness and adoption of open access archiving.

Conclusion

This exploratory study represents an attempt to uncover the underlying attitudes of New Zealand doctoral students toward open access publication and institutional repositories, as well as their attitudes to the mandatory submission of their theses to their university repository.

Student awareness of open access and institutional repositories

The study shows that awareness of open access and institutional repositories is still fairly low, even in a research-focussed community of doctoral students. While the majority of interview and survey respondents indicated that they support the concept of open access, the interview transcripts indicate that most respondents lack a deep understanding. Given that the mandatory submission policy has been in effect since 2007, all students are given information on repository submission via the Massey University Doctoral Handbook, policy information is available online via the Graduate Research School and Library Websites and Massey Research Online is linked from the library homepage, awareness of the university repository remains surprisingly low. However, high levels of awareness and support for open access and repository archiving among those interviewees who had attended a postgraduate Knowledge Management in Research library course indicate that this could be an effective forum in which to communicate information regarding the mandatory deposit policy.

Use of repositories, open access journals and monographs

In terms of doctoral students' use of repositories and open journals in their own research, results indicated that only a relatively small number of the respondents used open access research services like Kiwi Research Information Service, Australasian Digital Theses and EthOS. However, the overwhelming majority of respondents used Google Scholar, so it is likely that they access open access material from journals and repositories without realising it.

A small amount of data regarding the use of open journals in research and publication emerged from the interviews, but was not enough to adequately answer research sub-question: Do students use repositories and other open access journals and monographs in their own thesis research? Further research into the use of open access resources in scholarly research may be useful to investigate emerging publication and citation trends.

Perceived benefits and risks

In relation to benefits and risks, respondents had similar perceptions and concerns to those of academic staff and UK postgraduate students already documented in the literature. The respondents perceived that repository publication of theses was beneficial both for themselves and the research community, but had concerns regarding copyright and the potential for plagiarism.

Concern over the effect of archiving of theses on future publication was a recurring theme in the literature and in the current research, but was not able to be addressed within the scope of this project. In order to address this concern within the academic community, an investigation of publishers' perceptions of open access and institutional repository deposit and the effect of repository archiving on future publication may prove a useful contribution to the institutional repository literature.

There appears to be an overwhelming support for the principle of open access in enabling public access to research. Knowledge-sharing for the public good was clearly a key principle for the doctoral students surveyed and one that may not yet have been explored by library and Graduate Research School staff when promoting repositories to the doctoral student community.

Finally, the ubiquity of Google Scholar as a research tool cannot be ignored. It was found to be used by almost all respondents from all disciplines and is accessible to those researchers working outside the university environment. Making students (and staff) aware that if their work is in a repository it will then be available on Google Scholar could be a useful promotional strategy.

Disciplinary differences (and influences)

While there were some differences in awareness of open access and repositories between the disciplines, they were not as marked as expected, considering the differences described in the literature. When separated by college, responses concerning attitudes toward the benefits and risks associated with repository archiving and open access forms of publication were surprisingly similar. Hopefully, this result indicates that the next generation of researchers in all disciplines are increasingly open to new models of research publication and are perhaps more comfortable in the online research environment than their earlier

counterparts. However, it is important for repository administrators and library staff to consider the perceptions of academic staff and supervisors, as they were found to have the greatest influence on the perceptions of the respondent group.

Willingness to comply with the mandatory deposit policy

This study indicates that the mandatory deposit policy is a useful strategy to build the core collection of an institutional repository and one that is supported by the majority of survey respondents. The majority of respondents either agreed or strongly agreed that theses should be made openly available online. In addition, over 90% of survey respondents who were covered by the mandatory deposit policy were found to be willing to comply. It was also interesting to note that 83% of the respondents who were not covered by the policy were willing to voluntarily deposit a copy of their thesis in the repository.

The key recommendation for the library and information profession is to ensure that the mandatory submission policies and the benefits of repositories are communicated to students through a variety of channels including academic supervisors, official research school communications, handbooks, library workshops and other liaison or outreach services in order to ensure that each student understands the purpose and benefits of archiving their theses.

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