Higher Education
Library Technology

Aggregate and amplify – enhancing the value and use of theses and dissertations
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This is the sixth Higher Education Library Technology briefing paper. HELibTech [1] is a free and open community resource which aims to provide a starting point for anyone interested in library technology in Higher Education. This paper was supported by sponsorship from ProQuest[TM]. The author retained full editorial control over the content of tis paper and maintains an independent and impartial view of the issues.

Open Access

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[1] helibtech.com
[2] https://creativecommons.org/publicdomain/zero/1.0/

Contents

A note on terminology [1]

The terms 'thesis' and 'dissertation' (TDs) are used differently in different institutions and countries. In this paper the terms are used interchangeably to mean a research output produced by a post-graduate (Masters, PhD etc) student. PhD theses/dissertations typically have to include original research.

Introduction

Theses and dissertations (TDs) form a core part of the research outputs of an academic institution, and postgraduate students are critical to the wider research enterprise. In Australia, for instance, more than half of the time devoted to research in universities comes from postgraduate students. [2] However, TDs do not usually get the same attention as journal published research. To raise awareness, UK library staff celebrated *#ThesisThursday* in 2018 to focus attention on the less talked about TDs. 'Although doctoral theses are not generally considered to be as important as journal articles, they are a rich and underused source of information, capable of carrying much more context and commentary than a brief article.' [3]

> **Theses and dissertations (TDs) form a core part of the research outputs of an academic institution**

One of the reasons for this past inattention is TDs do not typically contribute to university ranking exercises. The UK's (2021) Research Excellence Framework (REF) states PhD theses and dissertations 'are not eligible for submission to REF 2021.'[4] They can nevertheless have major impact. For example, after making Stephen Hawking's 'historic and compelling' 1966 thesis *Properties of Expanding Universes*, freely available online, Cambridge University reported, 'a huge response …with almost 60,000 downloads in less than 24 hours.' [5]

Clearly the Hawking's thesis is exceptional, but TDs are an important form of scholarly communication as they
- provide great sources for specific areas of research.
- are based on original research.
- are often multi-disciplinary scholarly works.
- typically test and present new ideas and topical trends.
- may contain comprehensive data and results of lab experiments, fieldwork, surveys, and statistics that are often the basis of journal articles—details journal articles often don't include.
- provide valuable context for learning about and connecting with faculty, institutions, and fellow scholars.

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Meeting the needs of authors

Undertaking postgraduate study requires time and dedication, and gaining a PhD is a badge of academic excellence. In the humanities, Professor Robert Eaglestone, of Royal Holloway, University of London, 'considers the PhD thesis – and, relatedly, the monograph – as the "gold standard", since it remains the best means by which to capture "the unfolding of the mind" that a doctorate constitutes.' [7]

Nevertheless, entering an academic career requires much more than a gold standard TD. 'Making connections with other researchers in your field …will complete the jigsaw and make you a "winner"!' [8] Many researchers have career goals that require the extension of their research beyond the university walls. With increased exposure, authors gain wider reach and recognition for their work and build greater influence in their field of research. Furthermore, 'by being able to access the number of citations and downloads their thesis receives, each student has the opportunity to measure their thesis' impact – a useful tool when it comes to job applications or promotion panels.' [9]

Making dissertations and theses available in institutional repositories and in aggregations discourages acts of plagiarism since the author's work is widely discoverable and available.

A TD that is widely discoverable and available could ultimately lead to further research opportunities or even new or renewed funding streams

In partnership with Turnitin.com, 'a solution for preventing multiple forms of plagiarism' [10], ProQuest Dissertations & Theses (PQDT) Global provides a means of ensuring the originality of new work. Additionally, creators of previously produced work are appropriately acknowledged.

What is valuable to the author can translate into value to the institution and the wider community. A TD that is widely discoverable and available could ultimately lead to further research opportunities and new or renewed funding streams. Getting their work disseminated to a global audience is a growing imperative for TD authors.

Meeting the needs of the institution

Universities are working more actively to make this category of research outputs easily discoverable and accessible. By doing so, they increase visibility both for the institution and the individual by amplifying the reach to a global community of scholars:

> The main contention and change is around discoverability and access of these wonderful works. We live in a connected and interconnected world and the traditional expectation that to see a thesis I would have to know it existed and then approach the institution for a copy is not how academics work anymore. [11]

The role of the Institutional Repository
Once the value of TDs is recognised, it becomes more important to include these outputs in a robust research database. Many institutions use the Institutional Repository (IR) to address open access requirements and to promote the institution's research contributions. However, they often have limited search capabilities. Michael Upshall of Unsilo, a provider of artificial intelligence tools and solutions, analysed a major university IR and

Institutional repositories are focused on *local* institutional outputs and *local* infrastructure, and this can be limiting

noted, 'while the principles on which the repository was founded seem to have been sound, the resulting collection doesn't seem to be very searchable.' [12] Moreover, institutional

repositories are focused on *local* institutional outputs and *local* infrastructure, and this can be limiting.

The value to other researchers

TDs not only help make the author's personal research profile more visible but also allow other researchers to make connections and build on that research. 'The doctoral thesis is a window into the most cutting edge thinking in any discipline.' [13] The British Library E-Theses Online Service (EThOs) website points out:

> You can uncover existing research relating to your own area of study, download the theses you need to read, and find examples of well-structured theses and methodologies. You can find out about specific research undertaken at different universities or see the research that academics have supervised.[14]

Furthermore, published research literature (journal articles) can be biased toward statistically significant results, whereas PhD dissertations, in particular, represent the entire data field of the study and provide an unbiased view of the research that took place. 'A failed hypothesis or experiment is just as likely to be important and have a degree awarded as one where the student "proved" their contention.' [15] In disciplines such as Arts, Humanities, and Social Sciences where journals are not necessarily the primary form of scholarly communication, TDs offer access to significant primary research not published in any other format.

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Identifying research gaps

It can take several years for a PhD TD to make its way into the publishing process even if it meets quality and novelty criteria. Consequently, the value of a recent PhD dissertation is that it can provide a window into *current* research. 'With the increase in those seeking a PhD, actually finding new topic areas is problematical. By having easy access to what has gone before we help improve the journey of current and future candidates and help advance science and thinking in general.'[16] The London School of Economics (LSE) found:

> Students and scholars make use of dissertations to reveal the most comprehensive and cutting-edge developments in their field. A dissertation is often the first location, and sometimes the only location, that new discoveries and ideas surface prior to book and journal publication. For example, undergraduates at the LSE were enthusiastic about the opportunities that digital theses offer for accessing cutting-edge research, pointing out that they become available much more quickly than monographs or journal articles. [17]

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Research methodologies

In 2013, the British Library gathered information on how researchers use their aggregated TD service EThOS for their research:

> The survey found that …. a quarter used EThOS to find information about the PhD research process, research methodologies or how to structure their own thesis. This ability for users to be able to browse information from *all* UK institutions at the same time allows them to see a picture of UK doctoral research as a whole and pick up trends and information about emerging research fields, new subject areas, thesis structure and research methodologies, as well as being able to draw out references and research content from across all UK theses from one place. Comments from respondents included:
> *"I look at Ethos regularly to find out if a thesis has been written on a particular subject or topic."*
> *"To get used to the size of argument or issue required at doctoral level."*
> *"Helped me with structuring my thesis."* [18]

Usage data, text and data mining

Aggregations offer the opportunity for improved usage statistics but perhaps more importantly opportunity for text and data mining (TDM):

> In research, TDM offers up huge opportunities to engage in cutting-edge investigations. By carrying out computational analyses on large corpora, it is possible to make new discoveries, bring about a more accurate/efficient research process and advance scholarship. [19]

Aggregations of TDs can not only present a picture of *current* research activities but also trends over time because they include older research

Analysing the metadata can provide useful insights. For example, the British Library makes the EThOS metadata available to help provide answers to a number of potential questions: [20]

- Which institutions are key for our research field?
- How has research in our area changed over time?
- Who are the funding bodies in my field?
- Does research funding influence what is studied?

Aggregations of TDs can not only present a picture of *current* research activities but also trends over time because they include older research. For example, The EThOS service provided 30,000 thesis records in the field of chemistry to the Royal Society of Chemistry. The metadata included year of award, institution, keyword, abstracts and Dewey subject classification. The Society used the data to analyse trends in chemistry research – and by implication trends in the focus of chemistry research funding as well. [21] The availability of full text and not just bibliographical data and abstracts in the TD database itself is a major advantage in terms of TDM, and PQDT has also been used extensively for this purpose.[22]

TDs and Open Access

Awareness of Open Access (OA) is growing as OA publication for researchers becomes mandatory, especially in the UK [23] and Europe. Indeed, an important goal for EThOS is to

help institutions meet the expectation of the UK Research Councils that PhD TDs should be made freely available in an open access repository to enable the widest dissemination of research. [24] Sara Gould from the British Library commented:

> Institutions themselves increasingly want to raise the profile of their expert research – including visibility of the research itself, the excellence of individual academic departments and indeed the whole university. Openly accessible theses offer a window on the incredible postgraduate research being carried out.[25]

Nevertheless, Open Access isn't simple. OA has multiple definitions, paths and motivations. The main focus to now has been peer-reviewed research articles and their preprints. [26] Most of the OA debate has focused on the various publication business models (e.g. Gold OA, Green OA) [27] that shift the ways research outputs are paid for. These models have not gone uncontested, especially in the humanities [28] where it is still (June 2020) argued that open access publication of PhD theses makes it difficult for studies to be published as books.[29] Delivering wider access is more than a question of how a publication is paid for. Additional services and systems are needed to make outputs discoverable and enable

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dissemination to all potential users who can benefit. There is clear opportunity for the better curation of TDs.

Aggregate and amplify

A study at the London School of Economics (LSE) was unequivocal: 'The inescapable conclusion was that a higher volume of available theses attracts much more traffic.' [30] If this is true of an institutional repository, then wider aggregations will amplify that effect. To achieve maximum visibility and dissemination of TDs, institutions need to work with third party aggregators.

The EThOS service aggregates TDs on a national (UK) basis and is now one of British Library's most heavily used services for researchers. The vast majority of new records being added to EThOS arrive as a result of a direct harvest of thesis metadata from institutional repositories.[31] However, it is limited in scale and scope. It accepts only outputs from UK higher education institutions, and Master's degree theses are not included. [32]

Tracking down TDs and then obtaining them, particularly from other countries, can be a time-consuming and involved process. Several services provide access beyond the local IR. [33] They complement, support and more importantly *amplify* local and national repositories and can increase traffic to them. They connect the graduate work from colleges and institutions from one side of the globe to the other.

The Networked Digital Libraries of Theses and Dissertations (NDLTD) [34] is a membership organisation of universities. It harvests metadata from thesis repositories using the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) regardless of the participating universities' NDLTD membership status. Its *Global ETD Search* covers nearly six

million electronic theses. DART-Europe is the European Working Group of NDLTD and is a partnership of research libraries and library consortia with the goal to improve global access to European research theses. It provides access to 828,728 open access research theses from 619 Universities in 28 European countries. [35]

ProQuest Dissertations & Theses Global™ (PQDT) [36] is an expanding collection comprised of over 5 million theses from the world's premier universities. It is growing by around 200,000 works each year and contains content from over 100 countries. With historical content dating back to 1637, and 2.7million records in full text, it is an extensive dissertations and theses database and harvested by Google as the primary source for Google Scholar indexing.

EBSCO OpenDissertations [37] is an open-access database built to assist researchers in locating both historic and contemporary dissertations and theses. It incorporates EBSCO's previously released *American Doctoral Dissertations* and features additional dissertation metadata contributed by select colleges and universities from around the world. It aims is to drive additional traffic to TDs in institutional repositories.

OCLC WorldCatDissertations provides access to TD catalogue records created by OCLC member libraries. [38]

TD data will also find their way (typically via some of the aggregations listed above) into services such as Google Scholar and the central indexes of discovery services provided by companies such as ProQuest and EBSCO as well as open access aggregations based on IR harvesting such as CORE [39] and BASE.[40]

Adding value

Specialised TD aggregations add extra value in several ways.

Enriching metadata

Enriching metadata improves discoverability for users and the enriched metadata can be harvested by services such as Google Scholar making them more effective. The EThOS service developed a core set of metadata for UK theses 'to ensure all theses are described in

> **Enriching metadata improves discoverability for users**

a clear and consistent way, allowing users to find the theses they seek and institutions to share the data between repositories where required.' [41] The standard includes data for attributes that might be excluded from a conventional MARC catalogue record, such as person identifier (usually Orchid iD [42]); supervisor(s)/advisor(s); sponsor(s)/funder(s).

Because bibliographic records are sometimes created by the students themselves, the metadata for their theses may only include minimal information. EThOs staff edit and enhance metadata manually where they identify gaps.

PQDT employs a large team of experienced editors who manually review the submitted TDs. They check for completeness and ensure the accuracy of the metadata. For every record, the service confirms, and if necessary, adds fields: Author, Title, Degree, Year, Page Count,

Department, Subject and Classification and Keywords. Links are made to an Orchid iD if it exists, and new Orchid iDs can be created through the *ETD Administrator* workflow tool:

> Editors proof and correct graduate work title pages, matching exactly the title metadata, and check abstracts for errors in formatting and spelling. In addition, the metadata is enriched by adding subjects (from our controlled vocabulary), classification, committee members, and keywords in order to maximize the discoverability of the graduate work. References are also extracted and hyperlinked to directly connect the work across multiple research sources. [43]

Enhancing search and discovery

In addition to enhancing metadata, TD focused aggregations can provide a search environment more tailored to the needs of finding relevant results. Keeping search functionality up to date needs continuous investment which can be a challenge. Speaking at a 2020 webinar, Sara Gould from the British Library described the search capabilities of EThOS as robust but admitted the system needed a refresh to meet current user expectations. [44]

ProQuest operates on a larger global scale and can leverage its extensive company-wide search technologies, (it owns Ex Libris which provides the Summon [45] and Primo [46] discovery services), to provide both simple search and very granular advanced search options that includes full text and proximity searching. Further down the road we will almost certainly see AI/machine learning technologies being applied.

> **It is all very well discovering a TD record, but users also want access to the actual document**

Access/Delivery

It is all very well discovering a TD record, but users also want access to the actual document. This is not always seamless or straightforward. The electronic full text may only be available from the institutional repository, or it may only be available in hard copy. Making the TD open access clearly helps, but Glasgow School of Art (GSA) found that only 43 per cent of TDs in their institutional repository RADAR (Repository of Art Design Architecture Research) were OA.[47] 34 per cent of GSA TDs were "metadata only". The EThOS service provides a link where possible to the full text in the IR and enables users to request a digitised version where this is not already available. PQDT provides a straightforward option to download the PDF of the full text which is typically stored on the PQDT server.

Making historical work more accessible - Digitisation

While most current dissertations are published in print and digital form, some important work remains in print only. Acknowledging the value in historic TDs, a number of institutions have digitised older dissertations. For example, a project at the London School of Economics (LSE) found that these are still considered important and worth consulting ten, fifteen or twenty years after they were submitted. The most important finding for the LSE project was that the number of times a dissertation had been downloaded made a powerful case for digitising older theses.[48]

Digital preservation extends the life of research, ensuring insights and discoveries can have an enduring influence in the discipline. Digitisation improves access and critically increases visibility and availability beyond the institution. Speaking in 2015 Dr. Ian Rowlands, University of Leicester, explained that a key driver for their digitisation programme was to enhance the visibility of the institution itself. [49] Fiona Greig, former Head of Strategy and E-Resources at the University of Surrey, commissioned a significant digitisation project and noted, 'we have seen evidence of the increased use and impact on scholarly thinking of …theses that we have been able to make available.' [50]

> **Digitisation improves access and critically increases visibility and availability beyond the institution**

Few institutions have the infrastructure or capability to digitise historic collections themselves. The actual digitisation is just the first step. Infrastructure is also needed to ensure ongoing preservation. It makes sense for these kinds of solutions to be provided at scale rather than on an inefficient local institution level. Such services can do more than assist with digitisation by enhancing metadata and offering dissertation and thesis promotion. This helps ensure that older graduate works are equally as discoverable as new works. Fiona Greig described how they addressed the issue:

> We were approached by Cathy Boylan about possibly being involved in the ProQuest historical digitisation project. For decades ProQuest has been the legal dissemination route for US Dissertations (still PhD level remember). They wanted to harvest from our repository and also offered to scan up to 2,000 of our theses which we had not got around to yet. The scanning would be undertaken by a firm in Ireland and then full quality assurance and cataloguing would be handled by the theses team in Ann Arbor in Michigan, USA.[51]

Preservation

A potential added benefit of digitisation is preservation. All works on PQDT are archived via ProQuest's digital preservation initiative, and contributing institutions have perpetual access to their own content free-of-charge. ProQuest also creates microform copies of theses as well as print copies for libraries and authors. Fiona Greig explained their thinking:

> **Old and fragile documents… without a systematic digitisation process…are at risk**

> Old and fragile documents…without a systematic digitisation process…are at risk. Of course I could have done my own digital copy but that pales into what we get from ProQuest…as well as having a second electronic version on their platform, they produce a microfiche archive copy, and if things look really bleak that microfiche will end-up in the original Iron Mountain store; many hundreds of metres under a mountain "somewhere" in the USA. [52]

Overcoming barriers to dissemination

While research councils and universities can insist that publicly funded PhD research projects make their findings and data accessible to everyone, many students are funded either by employers or sponsoring companies. Often their contracts say the data belongs to the 'home' company. Similarly, in the case of studentships funded privately or by other nations, the intellectual property (IP) of many outputs resides with the student. A TD is a

significant work and intellectual effort, and universities typically grant a number of 'authors rights'. For example, Western University of Health Sciences declares:

> As an author, you retain copyright of your work. This means you have the right to:
> - Make copies of your work
> - Distribute your work in any form you want to anyone you want
> - Create new works (such as articles or books) based on your research
> - Perform or display your work publicly
> - Grant any of these rights to anyone you choose [53]

Honouring author rights is always a consideration that institutions must address when following their own open access strategies. They need to ensure that dissemination partners also honour and respect these rights and have adequate policies in place to address different situations.

Embargoes

There can be several reasons for an embargo. For example, the thesis contains personal data or material obtained under promise of confidentiality that cannot be effectively anonymised, or the thesis may contain commercially sensitive information.

As noted earlier, students may also wish to place embargos because of a fear that material published in theses in e-format is unlikely to be accepted subsequently as suitable for traditionally published monographs. The reality is that publishers and their editorial boards vary in their views on whether the submission of a TD to an institutional repository or a wider aggregation constitutes a prior publication that may disqualify the author from submitting a journal article. While the majority of publishers do not find the dissemination of a dissertation or thesis problematic, potential conflicts should be carefully considered and explored. The Committee On Publication Ethics (COPE) produced guidelines in 2017.[54]

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The University of Surrey has acknowledged the issues and is working with all the major publishers in the UK to try and bust the 'prior publication' myth. As more and more older TDs get digitised, enabling wider and easier dissemination and download, the question of permissions also arises. The University took a pragmatic approach:

> Our "contract" with the students makes it very clear that the Library copy is to be made available to the general public. My view... endorsed by the University Research Committee is that there is no need to seek further permissions. We had never sought permission to send a thesis to the British Library in the past, so why is "online" digitisation different to a microform digitisation? This is just a format shift and any attempts to trace academics to seek permission would be wasted staff resource that should be used supporting our services. [55]

Non-traditional formats

The nature of TDs is changing in a networked digital world. Outputs are becoming richer to include datasets, maps, websites, creative expression (performances) and apps.[56] These non-text theses can be challenging to submit, store and manage for future researchers, and not all services support these formats:

> That type of result is not something we will easily manage in a pre-print type repository. And it gets worse as you move across the scale from hard science, via medicine and biochemistry (an expressed gene is a possible research output) and when you get to the arts, especially performing arts, fine art, design, textiles etc things become very strange. How do libraries allow long-term open access to what was actually a multisensory installation? [57]

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Conclusion

Getting their work disseminated to a world-wide audience is a growing imperative for authors of theses and dissertations (TDs). Authors, institutions and the wider research community have much to gain from the global aggregation and amplification of TDs. Both current and historic TDs have proven to be valuable resources for scholars worldwide.

While TDs have been collected for years in local repositories, access has often been difficult for those outside the local framework. To amplify the reach to a global community of scholars, specialised TD aggregations are hugely valuable, as they can enrich metadata for enhanced discovery, index full texts, digitise and preserve older materials, provide a rich dataset for text and data mining, and provide a platform for outputs in non-traditional formats:

To amplify the reach to a global community of scholars, specialised TD aggregations are hugely valuable

> The growing awareness of the value of theses and dissertations, especially in terms of the wider research community will accelerate the trends to more global aggregations and the digitisation of older material. Individual institutions are likely therefore more to take advantage of a growing *global* infrastructure that compliments and amplifies local initiatives. [58]

The fundamental argument for an aggregated, amplified, global and digitised approach to TDs is about serving the greater good. Indeed, this goal is shared across universities, publishers and intermediaries even though they may at times argue over the precise means.

When Stephen Hawking's 1966 thesis was finally made freely available online, he commented, 'Anyone, anywhere in the world should have free, unhindered access to not just my research, but to the research of every great and enquiring mind across the spectrum of human understanding. Each generation stands on the shoulders of those who have gone before them….' [59]

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Ken is a member (MCLIP) of CILIP and ALA. He is an Advisory Board member for the open access journal *Studies in Arts and Humanities.* For six years to 2016 he was a main committee member of UKSG and until 2016 was a committee member of the NISO Open Discovery Initiative (ODI). He set up and manages a number of free, open community resources including Higher Education Library Technology (HELibTech), Local Government Library Technology (LGLibTech) and Open Specifications for Library Systems (LibTechRFP).

NOTE: Links were current at 1 July 2020

[1] 'A doctoral thesis is a focused piece of original research which is performed in order to obtain a PhD' https://www.enago.com/academy/thesis-vs-dissertation/   There is further discussion about the differences in usage between the US and the EU and UK on this site

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[12] Are institutional repositories designed to be searchable?. Michael Upshall. Thinking about Digital Publishing [Blog] 22 December 2019. http://www.consultmu.co.uk/2019/12/22/problems-with-metadata-an-institutional-repository/

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[14] Ethos website https://www.bl.uk/ethos-and-theses/about-ethos

[15] Unlocking the PhD: From Behind Closed Doors to Immediate International Availability – a UK University Perspective. Fiona Greig. INFORUM 2017: 23rd Annual Conference on Professional Information Resources Prague, May 30-31, 2017 https://www.inforum.cz/pdf/2017/greig-fiona.pdf

[16] Unlocking the PhD: From Behind Closed Doors to Immediate International Availability – a UK University Perspective. Fiona Greig. INFORUM 2017: 23rd Annual Conference on Professional Information Resources Prague, May 30-31, 2017 https://www.inforum.cz/pdf/2017/greig-fiona.pdf

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[18] UK theses and the British Library EThOS service: from supply on demand to repository linking Sara Gould. Interlending & Document Supply. 2016 https://doi.org/10.1108/ILDS-10-2015-0033 OA Preprint available from https://core.ac.uk/download/pdf/144790090.pdf

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