

## Electronic Theses and Dissertations at Virginia Tech: A Question of Access

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### Abstract

Since January 1, 1997 graduate students at Virginia Tech have been required to submit their theses and dissertations in electronic format. These Electronic Theses and Dissertations (ETDs) have been the subject of much discussion by faculty and students at Virginia Tech, as well as by a broader international community of publishers, scholars, and librarians. One of the questions posed in these discussions is: "Compared with traditional paper format theses and dissertations (PTDs), do the ETDs increase or decrease access to information?" After providing a brief historical context of ETDs at Virginia Tech, this paper examines the question of ETD access at that institution. Several aspects of access are presented among which are: total number of ETDs accessible, number of times ETDs and PTDs are accessed, access variations by department and college, archival access of ETDs, and access of ETDs through ILL. More specifically, it also examines the College of Engineering ETDs and compares their access to ETDs from other disciplines. It is concluded that the two major access factors are: 1) total ETDs available and, 2) ease of accessing ETDs. With regard to the first, ETDs severely limit access to theses and dissertations, prohibiting worldwide access to nearly 40% of the engineering ETDs, and over 60% of the non-Engineering ETDs. With regard to ease of access, for the ETDs that are available worldwide, there is immediate and complete access, a significant improvement over PTDs. Finally, the paper makes suggestions for modifying data gathering in the submission process, in order to enhance the probability that access can be increased.

### I. ETDs at Virginia Tech: Background Information

This brief historical overview of Electronic Theses and Dissertations (ETDs) at Virginia Tech is included to give context to the discussion about ETD access that follows. Comprehensive information regarding the background of ETDs at Virginia Tech can be found in the resources cited below. In order to facilitate information retrieval about the ETD history at Virginia Tech, all the sources cited are available on-line, and URLs have been provided.

### Funding

In 1996 Virginia Tech received funding from the Southeastern Universities Research Association to explore ETDs as SGML documents. This was followed in 1997 by funding from the U.S. Department of Education's Fund for the Improvement of Post-Secondary Education, which would allow Virginia Tech to extend ETDs to the national level.<sup>1</sup> In addition, Adobe Systems Inc., IBM and Microsoft provided software and hardware support for the project.<sup>2</sup>

## **Networked Digital Library of Theses and Dissertations**

The funding Virginia Tech received from the U.S Department of Education was used to establish the National Digital Library of Theses and Dissertations (NDLTD)<sup>3</sup> (later renamed the Networked Digital Library of Theses and Dissertations<sup>4</sup> as a result of international participation). Currently, NDLTD has 57 member universities and 7 member institutions from over 15 countries (Appendix One). A list of NDLTD members is maintained at <http://www.ndltd.org/members/index.htm>

### **Implementation**

Beginning in 1996, students at Virginia Tech were given the option of submitting ETDs and the archiving fee of \$20 was waived for those doing so. Even with this waiver, only 85 students chose the electronic option.<sup>5</sup> On January 1, 1997, ETD submission became a requirement at Virginia Tech.<sup>6</sup>

### **Goals**

The three primary goals of the NDLTD are: 1) to educate students so that they are prepared to function in the Information Age; 2) to help universities create an information infrastructure that will allow the first goal to be met; and 3) to promote international information sharing.<sup>7</sup>

It is the third of these goals, information sharing, or access, that this paper will examine.

## **II. ETDs at Virginia Tech: A Question of Access**

Throughout the ETD initiative at Virginia Tech, the question of access has been debated. McMillan notes that paper format theses and dissertations (PTDs) circulate infrequently<sup>8</sup>, while some ETDs have been accessed thousands of times on the WWW.<sup>9</sup> However, she also shows that less than half of the ETDs submitted are accessible to researchers outside the Virginia Tech community.<sup>10</sup>

What **are** the aspects of "access" that need to be considered when determining if a document has become more or less accessible? Have ETDs increased or decreased access to information when compared to PTDs? What are the information access tradeoffs between ETDs and PTDs?

The section examines several aspects of ETD access and discusses whether ETDs have increased or decreased access. More specifically, it examines the College of Engineering ETDs and compares their access to ETDs from other disciplines.

### **Access: what are the options available for Virginia Tech ETDs?**

From the beginning of the ETD initiative at Virginia Tech, there was concern that placing ETDs on the WWW might jeopardize future publication of the material in books or refereed journals, might compromise pending patents, or might reveal too much concerning future research plans at Virginia Tech. Because of these concerns, the four levels of access described below were established.

Unrestricted - As the name implies, this access level allows anyone, anywhere to read or download the ETD. It allows immediate worldwide access to the ETD as soon as it is submitted. Information about the ETD may be listed in Dissertation Abstracts or other indexes, and UMI will be able to distribute microfilm or paper copies of the ETD.

Restricted - ETDs in this category can only be accessed by researchers within the Virginia Tech community. Access is controlled by IP address or by valid ID through a proxy server, and only Virginia Tech affiliates can access the full text data. Indexing and abstract information about the ETD may be listed in Dissertation Abstracts or other indexes, but no one outside Virginia Tech, not even UMI, will be able to provide copies of the ETD.

Withheld - This is the most restrictive access option. Information about ETDs in this category is not available to anyone outside of the Virginia Tech Office of Research and Graduate Studies. A search of the Virginia Tech ETD database or the Virginia Tech University Libraries online catalog will reveal no information about the author, title, or subject matter. No information is given to UMI for the Dissertation Abstracts database. In effect, no one outside of the author, the advisory committee, and the Office of Research and Graduate Studies knows that the ETD exists.

Mixed - The final access mode is very seldom used. It gives the author the opportunity to release parts of the ETD, but not others, or to publish two versions of a chapter, each with different access levels. For instance, one version of an ETD chapter might be restricted to Virginia Tech use only, and contain information that the student or faculty advisors wish to publish later. Because the restricted information is viewed only by the Virginia Tech community, publishers would equate the access with PTDs, and consider it as not previously published. A second version of the chapter would have Unrestricted access, but would not contain the data that was to be published later.

The Virginia Tech Graduate School ETD Submission Approval Form (Appendix Two), located at <http://lumiere.lib.vt.edu/etd.vt.edu/submit/approval.htm>, is used by students and faculty to specify the level of access for the ETD. Both students and faculty are required to sign the form, showing that they agree to the level of access stipulated.<sup>11</sup>

Although the form notes that the "withheld" status is for a period of one year, with a possible one year extension, in actual practice this has been a recommendation and not mandatory. ETDs which were "withheld" in 1997 are still categorized as such, and are unavailable to anyone. Virginia Tech is in the process of updating the accessibility of these ETDs. In addition, the "restricted" and "mixed" access levels can be placed upon the ETD permanently.

It is evident that ETDs allow fine-tuning of availability. In the past, students had two options, to release or withhold. Released documents were available to anyone through UMI, and withheld documents were available to no one. With ETDs students can limit the scope of availability and even prepare alternate forms of the ETDs to meet their dissemination needs. Having examined the access options available, how do these options translate into numbers of ETDs available for use?

### Access: how many ETDs are available?

When PTDs were used at Virginia Tech, virtually all documents were available to all users. John Eaton, the Associate Provost for Graduate Studies stated that there were never more than ten or twelve PTDs withheld at any one time. These were all withheld for possible patent applications, the withholding time was limited to one year, and the one-year period was very rarely extended. In effect, nearly one hundred percent of the PTDs produced at Virginia Tech were available to anyone who desired to use them. In the age of ETDs, as the following paragraphs show, the percentage of documents available has changed significantly.

At the present time (October, 1999) there are 2,098 total ETDs in the Virginia Tech collection. These include Theses (1140), Dissertations (926), and Reports (32). The Reports include major undergraduate research projects, as well as non-thesis and non-dissertation research projects at the graduate level. Because this paper is concerned only with thesis and dissertation access, the Reports are not relevant, and ETDs will refer only to theses and dissertations. The distribution of ETDs for Total Virginia Tech ETDs and also for the College of Engineering ETDs is given in Chart 1.

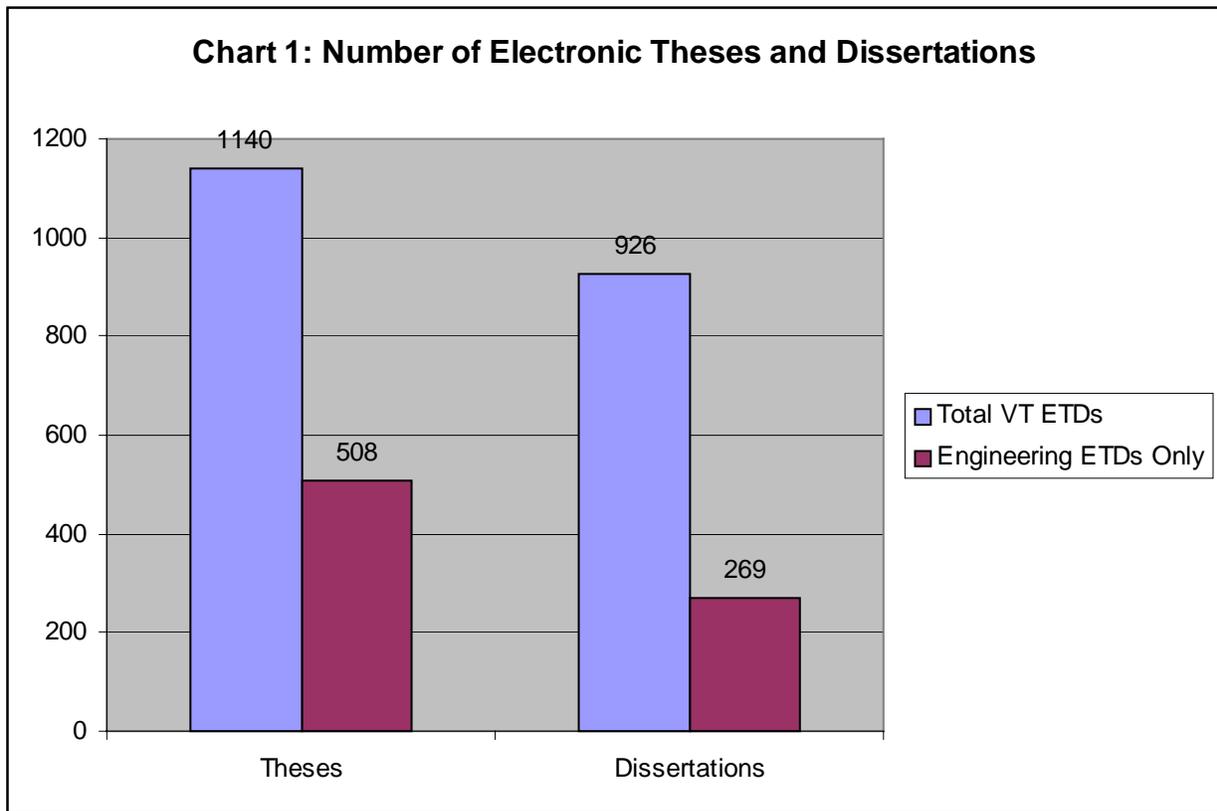
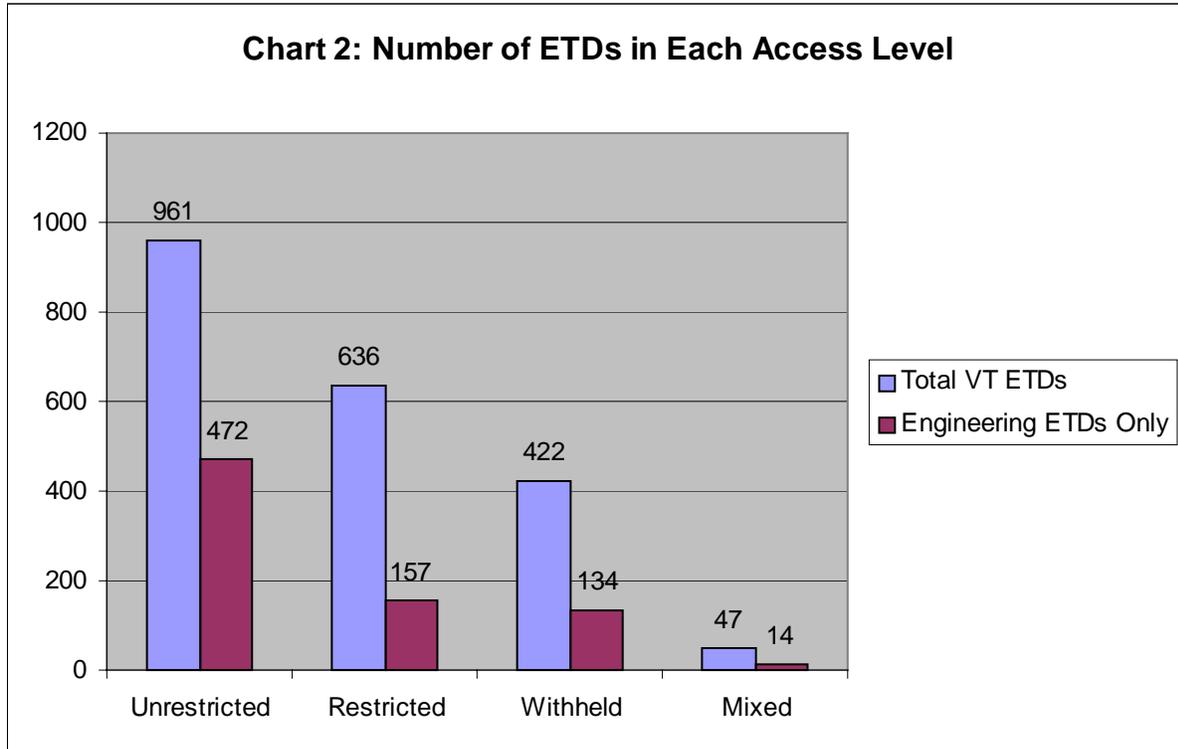


Chart 2 shows the number of ETDs in each access level. It is clear from this that the predominant choice for both the Total VT ETD collection and for the Engineering portion of the ETDs is Unrestricted. The Mixed option is seldom used.



In Chart 3, the percentage of ETDs in each access level is shown.

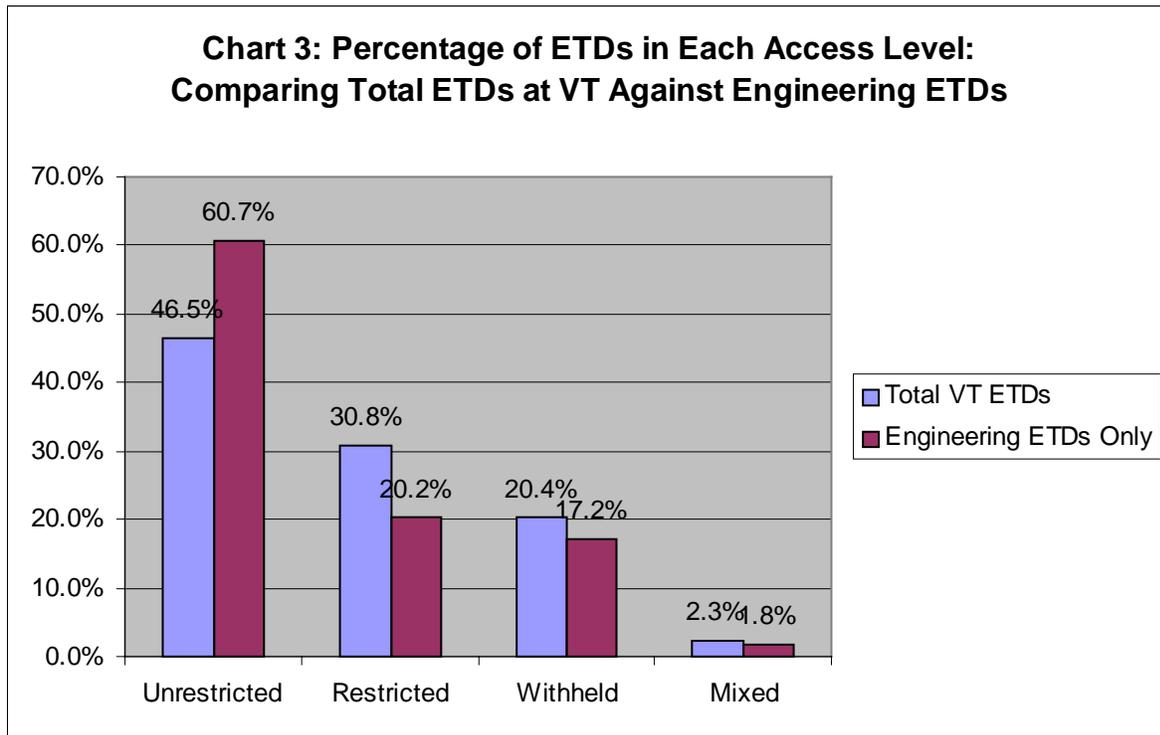
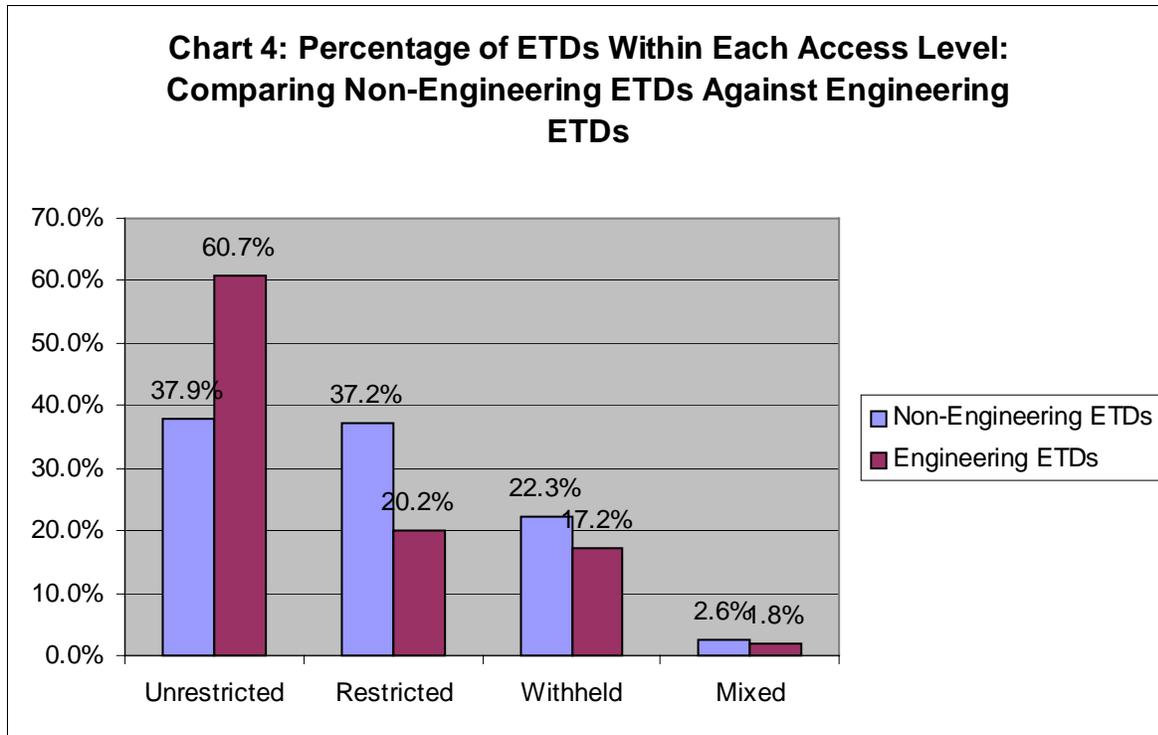


Chart 2 showed that the Unrestricted mode is the most frequently chosen access level. Chart 3, however, shows that even though the Unrestricted mode is the most popular choice, less than 50% of the Total VT ETDs are in this mode. In other words, more than half of the ETDs submitted at VT are either available only to VT affiliates (Restricted), or are not available at all (Withheld). The chart also clearly shows that College of Engineering ETDs offer significantly higher access than the Total Virginia Tech ETD collection.

A more startling contrast is shown in Chart 4. Here the access level of Non-Engineering ETDs is compared with the access level of Engineering ETDs.



By comparing Chart 4 and Chart 3, it's clear that the relatively high access rates from Engineering ETDs raised the overall access rates of the Total Virginia Tech ETDs. When the Engineering ETDs are removed from the Virginia Tech totals and Engineering ETDs are compared with Non-Engineering ETDs, the contrast is vivid. Only 37.9% of Non-Engineering ETDs are available outside the Virginia Tech community (Unrestricted), while over 60% of the Engineering ETDs are freely available.

Graph 4 has shown that the Engineering College provides a much higher access level than the University taken as a whole. But, how does Engineering compare with other individual colleges? By looking at the ETD data for each college at Virginia Tech, it is possible to discern differences of withholding. In Chart 5, abbreviations have been used as follows:

- AGR - College of Agriculture
- AHS - Arts, Humanities, Social Sciences component of College of Arts and Sciences
- ARC - College of Architecture
- BUS - College of Business
- ENG - College of Engineering
- HRE - College of Human Resources and Education
- NAT - College of Natural Resources
- SCI - Physical sciences component of the College of Arts and Sciences
- VMS - Veterinary Medical Sciences

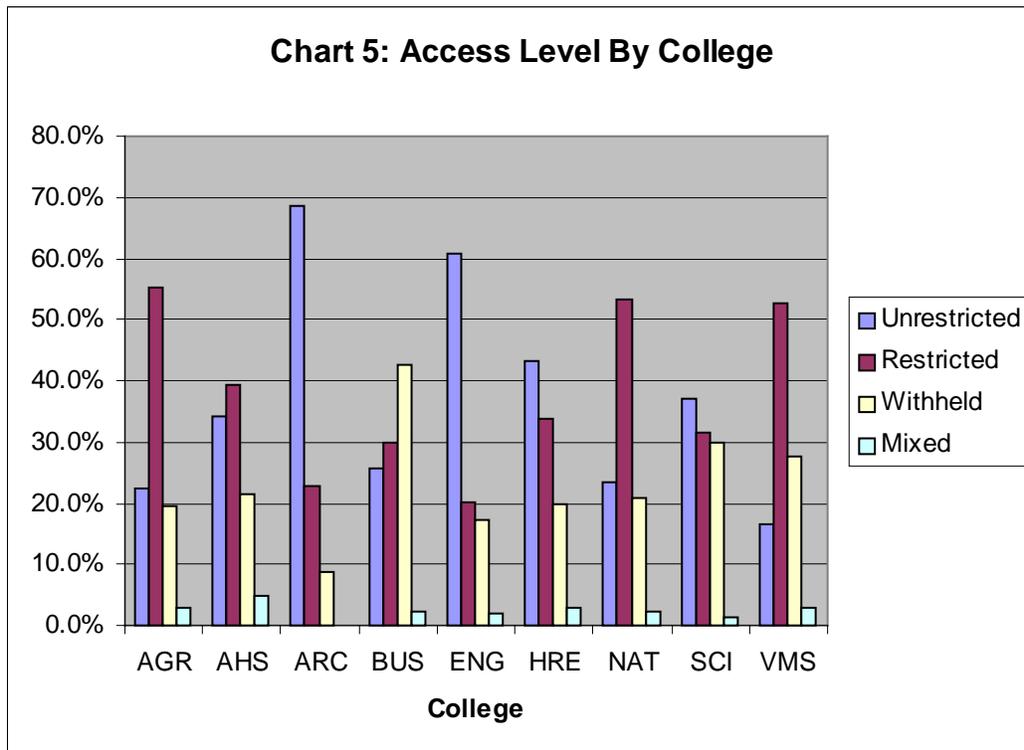
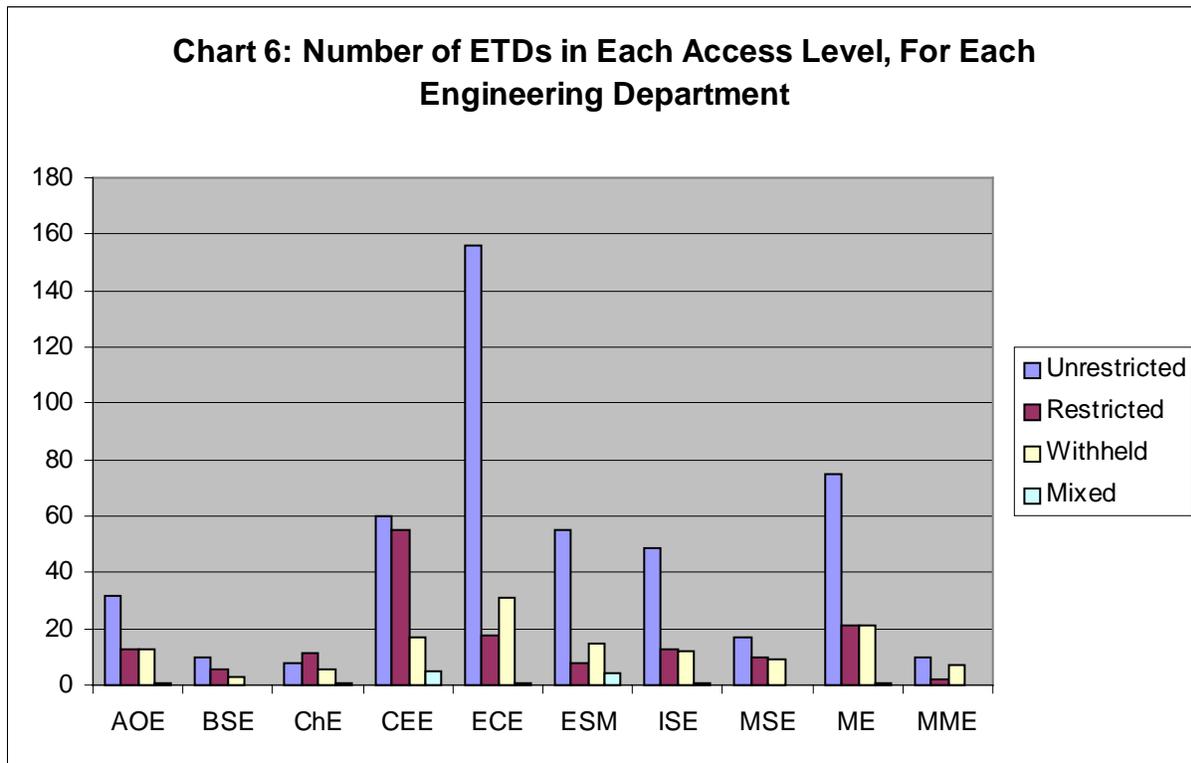


Chart 5 shows that the College of Engineering (ENG) has one of the highest percentages of Unrestricted access, second only to the College of Architecture (ARC). It clearly shows that only Engineering and Architecture give Unrestricted access to more than 50% of their ETDs. All other colleges Withhold or Restrict access to more than half, with the College of Veterinary Medicine placing access restrictions on over 80% of its ETDs.

Breaking out the data a final time, departments within the College of Engineering are examined. Abbreviations are used as follows:

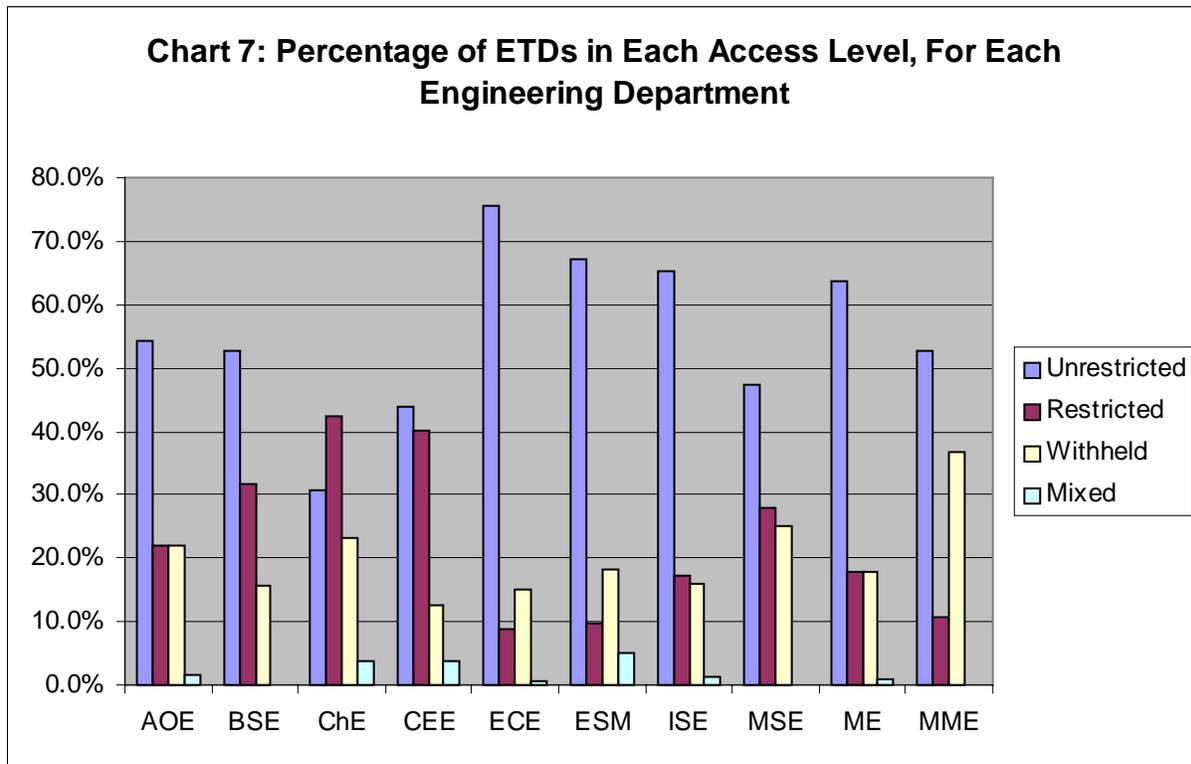
- AOE - Aerospace and Ocean Engineering
- BSE - Biological Systems Engineering
- ChE - Chemical Engineering
- CEE - Civil and Environmental Engineering
- ECE - Electrical and Computer Engineering
- ESM - Engineering Science and Mechanics
- ISE - Industrial and Systems Engineering
- MSE - Materials Science and Engineering
- ME - Mechanical Engineering
- MME - Mining and Minerals Engineering

Chart 6 shows the number of documents within each department at each access level.



It is evident that there is significant variation between the number of ETDs submitted by each department. Therefore, a large department such as ECE can effect the overall statistics of the College.

Chart 7 shows the access level percentage of ETDs in each department.



This chart displays a wide variety of access levels among the various engineering departments. Electrical and Computer Engineering (ECE) allows the greatest access, with over 75% of its ETDs in the Unrestricted mode, and only 15% Withheld. On the other hand, Chemical Engineering (ChE) allows Unrestricted access to only 31% of its ETDs. Interestingly though, rather than having a high percentage of Withheld ETDs, its predominant access level is Restricted, indicating that access by the Virginia Tech community is permissible, but access worldwide is not. Mining and Minerals (MME) ETDs have an access pattern very different than Chemical, minimizing the Restricted mode (11%), and either giving access to everyone (Unrestricted, 53%), or to no one (Withheld, 37%).

### **Access: how frequently are the documents used?**

In the above section, it was shown that the total number of theses and dissertations available for unrestricted use was significantly less in the ETD program than with the traditional PTDs. While the PTDs regularly had fewer than a dozen (less than 2 percent) withheld at any one time, the statistics show that more than fifty percent of the ETDs have some sort of access restrictions placed on them.

However, access should not only be measured by the total amount of information available, but also by the times that the available information is accessed. At Virginia Tech, the combined average circulation for Virginia Tech theses (submitted 1990-1994) was 2.47 times per copy.<sup>12</sup> Dissertations submitted during the same period had a combined average circulation per copy of 4.29 times.<sup>13</sup>

In comparison with this rate of usage, McMillan<sup>14</sup> has detailed the high rate of ETD use. Portions of her data have been used below.

The number of ETD files downloaded from the Virginia Tech server is shown in the table below.

Files Requested Annually			
	1996	1997	1998
PDF file downloads	4,600	72,854	343,236
HTML file downloads	28,225	129,831	215,896

Most ETDs have only one PDF file. However, even if it is assumed that there are two PDF files for every ETD that is downloaded, the 343,236 PDF file downloads in the table above represents 171,618 complete ETDs downloaded in 1998. In 1998, when there were approximately 1546 ETDs in the collection, the average ETD would have been accessed 111 times. It is clear that the average number of downloads for each ETD is much greater than the average number of circulations for PTDs.

There are two additional factors that must be considered in this comparison. First, the number of downloads cannot be correlated exactly with the number of circulations. It's very possible that patrons retrieve PTDs from library stacks and photocopy relevant sections without checking the item out. Therefore, circulations are not an actual count of the PTD use. Second, figures were not available from UMI for the number of paper or microfiche copies of PTDs sold by them. However, it's extremely unlikely that the in-house use of PTDs or sales by UMI would begin to make up for the huge discrepancy between ETD downloads and PTD circulations. It's clear that ETDs are used more than PTDs.

### **Access: what type of information is available in ETDs?**

Yet another measurement of access is the type of information available in ETDs versus PTDs. In paper format, authors are limited to what can be placed in paper, or perhaps in a video, floppy disk, or other form of media appended to the document. At best, this is a cumbersome method, and at worst it is almost impossible to share with others interested in the material.

The ETDs give an opportunity to integrate several forms of media into one document, and provide a way to distribute this information to all users. ETDs can incorporate video, audio, interactive tutorials, working software programs, and inexpensive color images into one document available over the WWW.

As a result of simpler multi-media incorporation, some students have become more creative in their presentations, enhancing their ETDs with multimedia that would have been very difficult to append to PTDs. In addition, features such as color graphics are more frequently used because the copying and distribution cost in the ETD format is lower than that associated with PTDs.

An example of a media enhanced ETD is found at:

<http://scholar.lib.vt.edu/theses/available/etd-32498-21232/>

This Engineering Mechanics dissertation by Norman Schaeffler incorporates color images as well as Quick Time Virtual Reality movies. It clearly illustrates the potential that ETDs have for improving research presentations. There is no doubt that ETDs provide significantly more latitude than traditional PTDs.

### **Access: what are the indexing procedures for ETDs?**

ETDs with an Unrestricted or Restricted status are indexed in UMI's Dissertation Abstracts, in the same way as PTDs were formerly indexed. This leads to a rather perplexing situation.

The Unrestricted ETDs are indexed in Dissertation Abstracts, and full text copies of the ETDs can be provided by UMI to anyone who wishes to purchase them. However, it seems that very few people would wish to purchase Unrestricted ETDs that are freely available on the WWW.

On the other hand, Restricted ETDs are also indexed in Dissertation Abstracts, but UMI does not have the ability to provide full text copies of these. Therefore, researchers are made aware that an ETD is available on a topic, but they have no means to obtain the ETD.

Looking at the numbers, approximately 47% of the VT ETDs, (the Unrestricted mode), are indexed in Dissertation Abstracts and are available from UMI, while about 30% of VT ETDs, (the Restricted mode), are indexed in Dissertation Abstracts, but are not available through UMI.

The Withheld ETDs are not indexed by UMI and are not available through them.

### **Access: how do ETDs impact Interlibrary Loan?**

As mentioned above, 30% of Virginia Tech ETDs are Restricted and in the unique position of being contained in Dissertation Abstracts, but not available through UMI. These 30% are also not available through ILL. A user finding such an ETD in Dissertation Abstracts will not be able to obtain it from UMI, and will also discover that Virginia Tech's ILL department is unable to fulfill the request.

### **Access: how will archival ETD copies be maintained?**

The archiving process for Virginia Tech ETDs is detailed in the document *Archiving Electronic Theses and Dissertations: The Virginia Tech Experience*, found at <http://scholar.lib.vt.edu/theses/archive.html>. This document addresses the issues of access, security, and format migration. The Digital Libraries and Archives Department of the University Libraries at Virginia Tech is well aware of the necessity to provide long term access to ETDs.

In addition to providing long term electronic access, Virginia Tech ETDs with an Unrestricted status are still archived by UMI. When an Unrestricted ETD is submitted to VT in its final approved form, VT sends an e-mail to UMI. The ETD is then downloaded, printed, and microfilmed by UMI.

### **Access : Conclusions regarding the current status of ETDs**

Several aspects of ETD access have been considered. Of these, the two primary considerations seem to be the breadth or completeness of information accessible in the ETD format, and the immediacy and ease of access with the ETD format.

### **Availability: measured by breadth of information in ETDs**

It is clear from the data presented in the charts that the ETDs restrict the breadth of information available to researchers. Over 50% of the total ETDs produced at Virginia Tech, and nearly 40% of the Engineering ETDs from Virginia Tech, are either not available outside the Virginia Tech community, or are not available at all.

When assessing the variety, comprehensiveness, or totality of information available, the ETDs do not compare well against the traditional PTDs. As was noted, when PTDs were being produced, there were never more than ten or twelve, (less than 2 percent), withheld at any one time. Now, with the advent of ETDs, 20% are withheld from all viewers, and over 50% are withheld from anyone outside of Virginia Tech.

Focusing on the Engineering ETDs, 60% of all submitted ETDs are available. However, the 40% that are only available to VT affiliates, or are not available at all, may contain information of importance to researchers.

For those ETDs outside engineering, access is much more restricted. While over 60% of Engineering ETDs **are** available worldwide, over 60% of Non-Engineering ETDs **are not** available worldwide. Although this paper is not primarily concerned with Non-Engineering ETDs, still they contain research in computer science, natural sciences, agriculture, architecture, and other areas of interest to engineers. What information have engineering researchers lost by not having access to over 60% of the ETDs produced in non-engineering fields?

### **Availability: measured by ease of access to ETDs**

Just as it is clear that ETDs limit the breadth of information available, it is equally clear that they enhance access to those ETDs that are made available. Consider the 472 engineering ETDs that are immediately available on the WWW. How else could this access be accomplished other than through an ETD program? Consider the engineering ETDs that have been downloaded hundreds of times. How could this distribution be accomplished outside an ETD program? It is very doubtful that it could.

The ETD initiative has provided a forum for displaying, distributing, and incorporating research that formerly gathered dust on university shelves. Researchers are increasingly turning towards online information sources, and the ETD initiative has provided a means for graduate level research, in the form of theses and dissertations, to be included in that resource.

### **Availability: the final measurement**

So what's the bottom line? How do ETDs stack up against PTDs? Are they good, bad, or a wash?

Put more quantitatively, does the **immediate** worldwide access to 60% of the engineering ETDs outweigh the fact that there is **no** worldwide access to 40% of the engineering ETDs and no access at all to 17% of the engineering ETDs? Is it better to have an electronic format that gives immediate access to 60% of the engineering theses and dissertations and very limited or no access to 40%, or is it preferable to have a paper format that makes nearly 100% of the literature available, but delayed by up to a year?

In the Non-Engineering disciplines the questions seem to be even more critical. Is it worthwhile to have immediate worldwide access to 38% of the ETDs, if 62% of the ETDs are not available outside Virginia Tech, and 22% are not available to anyone?

It seems that the present state of ETDs at Virginia Tech have been a detriment to information availability. Even Engineering ETDs, which provide a 60% Unrestricted rate, have 17% in the Withheld category, making nearly 1 of 5 Engineering ETDs unavailable to anyone. Researchers live in a setting where information contained in books is three years old when published, and where journals may have a one or two year turn around time. It does not seem unreasonable to continue with PTDs and wait a few months in order to gain access to nearly all theses and dissertations, rather than embracing ETDs that provide only fifty percent of the theses and dissertations immediately. In the present situation, it appears that ETDs have decreased, rather than increased information availability.

Having said that, it's reasonable to believe that ETD access can be improved to the point where ETDs can have a bottom line advantage over PTDs. The percentage of ETDs in the Unrestricted mode can be increased, and the corresponding percentages in the Restricted and Withheld modes can be decreased.

However, in order to increase access, it makes sense to contact specific departments and individual faculty. The previous graphs show that access to ETDs varies greatly between colleges and departments. It makes little sense to exhort the College of Architecture to increase ETD availability when nearly 70% of their ETDs are already Unrestricted. However, it does

make sense to find out why the College of Veterinary Medicine has less than 20% of their ETDs Unrestricted.

It also makes sense to contact individual faculty who may be advising students to restrict access, in order to allay their fears. There are many reasons for restricting access. Patent applications pending, future research or grants jeopardized by publication, future publication of articles or books jeopardized by placing ETDs on the WWW, or the inclusion of proprietary information may have spurred a Withheld status. By identifying the reason, it may be possible to formulate solutions and increase the access. But it is unlikely that universal appeals will be effective. Individual contacts must be made

There are various ways that Unrestricted access could be increased. It might be possible to increase the requirements for restricting access, or it might be possible to put an automatic time limit on the restricted access. However, any method to increase access will require support from faculty, and the most efficient way to increase support is to focus on the colleges, departments and individuals that have displayed the greatest reluctance to allow Unrestricted access. In order to focus on those with the greatest reluctance the submission process should be structured so data can be easily analyzed.

### **III. Access: how might the submission process be modified to improve access?**

The data contained in this paper was obtained from the Virginia Tech Digital Library and Archives Department (DLAD). This department oversees the library aspects of the ETD initiative. It maintains the database that contains information from the Approval Form for ETDs (Appendix Two), and also from the Submission Survey (Appendix Three) completed by students after they submit their ETDs. It appears that the data collection on the Approval Form for ETDs was modeled after the PTD submission form, and was not modified to take advantage of database analysis. It also appears that the Submission Survey could be modified to enhance analysis. It is suggested that universities considering an ETD program use a data gathering system that lends itself to analysis in order to identify colleges reluctant to grant ETD access.

#### **Data Set One: The Approval Form For ETDs**

The first set of data received from DLAD contained one record for each department listed on the Approval Form for ETDs. The data was divided into three subsets: theses, dissertations, and other reports. For each departmental name the number of ETDs in each access level, (Unrestricted, Restricted, Withheld, Mixed), were provided. Sorting the ETDs by department would allow comparisons to be made. It soon became clear that the current submission process did not lend itself to this task.

On the Approval Form For ETDs students enter free text indicating their degree area, or department name. Therefore, students from the Electrical and Computer Engineering Department were allowed to enter numerous variations for their degree. The following is an excerpt from the database, showing some of the variations encountered:

Department Name	Unrestricted	Restricted	Withheld	Mixed	Total
Electrical & Computer Engineering	7	1	2	-	10
Electrical & Computer Engineering	1	-	-	-	1
Electrical Engineering	41	4	9	-	54
Electrical and Computer Engineering	54	3	6	-	63
Electrical and Computer Engineering (ECPE)	1	-	-	-	1
Electrical and computer engineering	-	1	-	-	1

In fact, students receiving degrees from the Electrical and Computer Engineering Department entered more than ten variations on that subject area. Although the above variations were relatively easy to recognize, it took time to standardize the department name and assign ETD access totals to Electrical and Computer Engineering.

Other subject areas were not so straightforward. Students receiving degrees in education were considerably more creative, using more than twenty-five different titles to describe their degrees. A portion of the list that contained education related degrees follows:

Department Name	Unrestricted	Restricted	Withheld	Mixed	Total
EDAC	2	1	-	-	3
EDAD	3	1	-	-	4
EDCI	1	-	1	-	2
EDLP	1	-	-	-	1
EDLPS	1	-	-	-	1
EDRE	-	1	-	-	1
EDSE	-	-	1	-	1
EDSP	3	-	1	-	4
EDVT	-	1	1	-	2
EDVT, Vocational, Technical Education	-	1	-	-	1
ELPS	1	1	-	-	2
ESM	-	-	1	-	1

Within the above list are degrees awarded from three different departments: Educational Leadership and Policy Studies; Teaching and Learning; and Engineering Science and Mechanics. Although the Engineering Science and Mechanics (ESM) abbreviation is quite obvious, the division between the other two areas is not. In order to determine which department was represented, it was necessary to search the ETD database by the given department name (such as EDAC), determine the department(s) from which the faculty advisory committee members came, and make a departmental assignment for the ETD.

Although students should be allowed to enter a free text term describing their degree, they should also be required to choose a department and college from a controlled vocabulary list. Perhaps drop down lists could be used, forcing students to choose the college and department that issue the degree.

By standardizing the department and college names, it becomes very easy to sort the entries and monitor the access distribution by department or college. Departments with high access restrictions can be identified and contacted. Perhaps solutions can be arrived at to make their materials more available. It does very little good to know that there is an overall 20% withholding rate on ETDs. In order to improve access, it's necessary to know what departments and colleges have the highest rate of withholding and why.

### Data Set Two: Faculty Advisors

The second set of data received also had the potential to provide information that would improve access to the ETDs. This data contained the following fields: ETD accession number; department from which degree was awarded, faculty name, faculty position on committee (chair, member), and access status (unrestricted, restricted, withheld, mixed). Because each ETD advisory committee has multiple members, each ETD had multiple records, as shown below for one Physics ETD:

etd-022299-083514	Physics	Alfred Ritter	Committee Member	unrestricted
etd-022299-083514	Physics	G. Indebetouw	Committee Member	unrestricted
etd-022299-083514	Physics	H. C. Dorn	Committee Member	unrestricted
etd-022299-083514	Physics	J. R. Heflin	Committee Chair	unrestricted
etd-022299-083514	Physics	R. Zallen	Committee Member	unrestricted

The 2098 Virginia Tech ETDs produced a spreadsheet of 9023 records.

Because this second data set was taken from the same database as the first data set, the problem of non-standardized department names remained. In addition, the faculty names were almost impossible to group and analyze because students currently enter faculty committee names in a normal "first name / last name" sequence, and different students enter the faculty names with variations.

The "A" portion of an alphabetical sort may be similar to the following:

A. Smith  
A. W. Smith  
Aaron Smith  
Adam Smith  
Al Smith  
Albert Smith  
Albert A. Smith  
Albert W. Smith  
Alfred Smith  
Alice Smith

This raises a basic question. How many of these names are variations on one person's name?

To further complicate sorting, some students enter the advisor's name with either the title of "Dr." or "Professor" preceding the first name. It's clear that the analysis of the advisor data is extremely difficult because the data can not be readily sorted.

It is necessary to implement a standard method of entering faculty names into the database, using a convention that will allow easy sorting by faculty advisor. A step in the right direction would be to have students enter the faculty names with last name first. This would enable a sort to be made which would circumvent the first name variations and titles that bedevil the present data entry. Also, it should be required that students use a full first name on the form, or if the faculty member uses a first initial and middle name, this would also be acceptable. As an alternative, it might be possible to assign each faculty member an ID number that is entered in a separate field in the submission form.

Just as there is access variation between colleges and departments, it appears that there is ETD access variation between faculty advisors. Because of the sorting difficulties, a thorough analysis could not be done, but a brief examination indicates that some faculty members have a higher rate of access restriction than others.

An effective way to increase ETD access may be to identify faculty with high ETD access restrictions and contact them on an individual basis. This is not for the purpose of applying pressure, but for the purpose of identifying the reasons for the high access restrictions, and trying to work out a solution that will increase access.

### **Data Set Three: The Submission Survey**

The third set of data received was the results of a survey that students complete when submitting their ETDs. In this survey, (Appendix Two), students are asked several questions including whether they were advised by faculty to restrict access to the ETD. With this survey, all data is compiled anonymously, and there is no way to correlate the response to this question with the department that grants the ETD or with the access level that the ETD was given.

Undoubtedly, it is desirable to maintain anonymity on this survey. However, the survey would be more useful if it was possible to correlate the department, the access level, and the advice given by faculty to restrict the ETD.

How would this correlation be helpful in increasing access? This final data set would allow analysis to be made to determine what departments give the highest level of advice to restrict access, and whether students are following the advice. It can probably be assumed that there's a correlation between advice given and advice taken, but there's no way to corroborate that. While it's interesting to note that 86.7% of students report that faculty advise them to restrict access,<sup>15</sup> this number is not helpful in efforts to improve access. What does it tell us about individual departments? What does it tell us about the number of students who follow the advice? What does it tell us about the relation of advice to the final access level of the ETD? Nothing on all counts.

By using the survey to link advice given with department and access level, anonymity could be maintained, but discussions could be held with specific departments to ascertain reasons for giving advice about specific access levels. Through these talks with specific departments, it might be possible increase the access to ETDs.

#### **IV. Updates on the Virginia Tech ETD Initiative**

The ETD Initiative at Virginia Tech is a work in progress. At the present time, modifications are being considered to the Electronic Submission Approval Form.

There is also a recommended "library friendly" Approval Form in which ETDs given Restricted or Mixed access would be available for ILL distribution. Also, after two years ETDs with Restricted and Withheld access would be released worldwide unless a written request was received from the author not to release.

The library friendly Approval Form, if adopted at Virginia Tech, would eliminate some of the problems noted in this paper, such as the inability of ILL to provide Restricted ETDs that are indexed in Dissertation Abstracts, and the difficulty in moving ETDs from Restricted to Unrestricted access. If adopted it would make significant progress in realizing the great potential of ETDs. It would provide immediate online worldwide access to nearly 47% of ETDs, it would provide immediate ILL access to another 31% of ETDs, and assuming that most authors would not extend access restrictions, it would provide online worldwide access to nearly 100% of ETDs after two years. The adoption of this new Approval Form would be greatly welcomed.

#### **V. Conclusions**

At the present time, ETDs at Virginia Tech decrease the total amount of information available to researchers. Nearly 40% of Engineering ETDs and over 60% of Non-Engineering ETDs are restricted in some way. Although the accessibility of Unrestricted ETDs is far greater than the accessibility of traditional PTDs, this increased access is more than offset by the unavailability of ETDs in the other access modes. The net effect is a loss of available information.

However, there is potential for increasing overall access to ETDs. This is unlikely to be accomplished by collecting general statistics. It will be accomplished by analyzing the access data according to colleges, departments, and individual faculty. It will be accomplished by speaking to individual concerns on an individual level, and gathering support for the new guidelines that release more ETDs for worldwide access. It does little good to appeal for increased access to a college that is already releasing nearly 70% of its ETDs to the world. It is much more efficient to enter into a dialogue with the college that restricts over 80% of its ETDs, and find out why.

## Appendix One - NDLTD Members

### 64 Official Members

#### 57 Member Universities

- Air University, Maxwell AFB, Alabama
- California Institute of Technology
- Chinese University of Hong Kong (Hong Kong)
- Chungnam National U., Dept of CS (S. Korea)
- City University, London (UK)
- Clemson University °
- College of William and Mary
- Concordia University (Illinois)
- Curtin University of Technology (Australia)
- Darmstadt University of Technology (Germany)
- East Carolina University
- East Tennessee State University
- Florida Institute of Technology
- Florida International University
- Freie Universität Berlin (Germany)
- Griffith University (Australia)
- Gyeongsang National University, Chinju (S. Korea)
- Humboldt-Universität zu Berlin (Germany)
- Indian Institute of Technology, Bombay (India)
- Miami University of Ohio
- Michigan Tech
- Nanyang Technological U. (Singapore)
- National U. of Singapore (School of Computing)
- Naval Postgraduate School, Monterey CA
- North Carolina State University \* °
- Pennsylvania State University \* °
- Rhodes University (South Africa)
- Rochester Institute of Technology
- St. Petersburg State Technical U. (Russia)
- Universidad de las Américas Puebla (México)
- Universidad Politecnica de Valencia (Spain)
- Université Laval (Québec, Canada) \*
- University of Colorado, Health Services Center
- University of Florida \* °
- University of Georgia \* °
- University of Guelph (Ontario, Canada) \*
- University of Hawaii, Manoa \* °
- University of Iowa
- University of Maine °
- University of Melbourne (Australia)
- University of New South Wales (Australia)
- University of Oklahoma \*
- University of Pisa (Italy)
- University of Queensland
- University of South Florida (Australia)
- University of Sydney (Australia)
- University of Tennessee, Knoxville \* °
- University of Tennessee, Memphis
- University of Texas at Austin \*
- University of Virginia \*
- University of Waterloo (Canada) \*
- University of Wisconsin, Madison \* °
- Vanderbilt University \*
- Virginia Tech \* °
- West Virginia University °
- Wilfrid Laurier University (Ontario, Canada)
- Worcester Polytechnic Institute

#### 7 Member Institutions

- Coalition for Networked Information
- Committee on Institutional Cooperation
- Diplomica.com
- Dissertation.com
- National Library of Portugal
- Organization of American States
- UNESCO

° = [Land grant institution](#) (11)

\* = [Association of Research Libraries](#) member (15)

## Appendix Two

### Virginia Tech Graduate School Electronic Thesis and Dissertation (ETD) Submission Approval Form

Student Name: \_\_\_\_\_  
ID#: \_\_\_\_\_  
Department: \_\_\_\_\_

Degree:     \_\_\_ Bachelor's             \_\_\_ Master's             \_\_\_ Doctoral degree  
Document Type: \_\_\_ Project Report     \_\_\_ Thesis             \_\_\_ Dissertation

Document Title: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### Student Agreement:

I hereby certify that, if appropriate, I have obtained and attached hereto a written permission statement from the owner(s) of each third party copyrighted matter to be included in my thesis, dissertation, or project report, allowing distribution as specified below. I certify that the version I submitted is the same as that approved by my advisory committee.

I hereby grant to Virginia Tech and its agents the non-exclusive license to archive and make accessible, under the conditions specified below, my thesis, dissertation, or project report in whole or in part in all forms of media, now or hereafter known. I retain all other ownership rights to the copyright of the thesis, dissertation, or project report. I also retain the right to use in future works (such as articles or books) all or part of this thesis, dissertation, or project report.

#### Student and Committee Agreement:

**Part A.** We agree that the above mentioned document be placed in the ETD archive with the following status:  
(choose one of 1, 2, 3, or 4)

- \_\_\_ 1. Release the entire work immediately for access worldwide.
- \_\_\_ 2. Release the entire work for Virginia Tech access only.
- \_\_\_ 3. Secure the entire work for patent and/or proprietary purposes for a period of one year. During this period the copyright owner also agrees not to exercise her/his ownership rights, including public use in works, without prior authorization from Virginia Tech. At the end of the one year period, either we or Virginia Tech may request an automatic extension for one additional year. At the end of the one year secure period (or its extension, if such is requested), the work will be handled under option 1 above, unless we request option 2 or 4 in writing.
- \_\_\_ 4. Release the entire work for Virginia Tech access only, while at the same time releasing the following parts of the work only (e.g., because other parts relate to publications) for worldwide access (check all that apply or provide an attached list):
  - \_\_\_ Abstract and key bibliographic data (i.e., from submission form)
  - \_\_\_ Files named as follows (i.e., separate PDF or multimedia files):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Part B.** (use only if you checked 2 or 4 above). Our preference regarding being contacted to see if we will give written approval to expand the access to the above mentioned document is: (choose one)

- \_\_\_ in 1 year
- \_\_\_ in 3 years
- \_\_\_ probably never (e.g., since a publisher will release a book version soon)

**Part C** (optional proxy). To cover cases such as when one or more of the student and committee signing this form becomes inaccessible, each of the following people (indicated by their names printed)

Printed name of proxy: \_\_\_\_\_  
Printed name of proxy: \_\_\_\_\_  
Printed name of proxy: \_\_\_\_\_

is authorized to serve as a proxy in submitting future versions of this form, so submissions with any of these proxies signing are officially recognized just as if the student and full committee signed. For example, it is suggested that the committee chair be a proxy.

**Review and Acceptance:**

The above mentioned document has been reviewed and accepted by the student’s advisory committee. The undersigned agree to abide by the statements above, and agree that this Approval Form updates any and all previous Approval Forms submitted heretofore.

Signed:	_____	_____
	(student)	(date)
Committee:	_____	_____
	_____	_____
	_____	_____
	_____	_____
	(committee member)	(date)

## Appendix Three - Submission Survey Questions

**1. While preparing your ETD, where did you find answers to your questions? Please select all that apply.**

VT ETD Web sites                      other Web sites                      through e-mail  
by telephone                              from New Media Center staff              from friends  
from your committee                      at an ETD workshop                      from ETD tech support  
other

**2. If you consulted the VT ETD Web information, how helpful was it?**

Extremely Helpful    Helpful    Neither    Unhelpful    Extremely unhelpful

**3. If you attended an ETD workshop, how helpful was it?**

Extremely Helpful    Helpful    Neither    Unhelpful    Extremely unhelpful

**4. Compared to what you were expecting, how difficult was it to create your PDF?**

Much less difficult    Somewhat less difficult    Neither    Somewhat more difficult  
Much more difficult

**5. Which computer did you use to create your PDF?**

Mac              PC    Unix    Other

**6. From where did you submit your ETD?**

Campus computer lab              New Media Center              Campus dorm  
Campus office                      Off-campus residence              Other

**7. Compared to what you were expecting, how difficult was it to submit your thesis/dissertation electronically?**

Much less difficult    Somewhat less difficult    Neither    Somewhat more difficult  
Much more difficult

**8. Within the next 1-2 years, what do you intend to publish from your ETD:**

book    chapter              presentation/conference proceedings  
article    nothing              other

**9. If you restricted access to your ETD, upon what did you base your decision?**

advice of a publisher              advice of others              advice of VT faculty              other reason(s)

**10. Please include any comments or questions that you have.**

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- <sup>1</sup> McMillan, Gail. 1999. The evolving genre of electronic theses and dissertations. *32nd Hawaii International Conference on System Sciences*. Based on proceedings prepared by Edward A. Fox, Gail McMillan, and John L. Eaton. <http://scholar.lib.vt.edu/theses/presentations/Hawaii/ETDgenreALL.pdf>, p. 3.
- <sup>2</sup> Fox, Edward A., Robert Hall, and Neill Kipp. 1997. *NDLTD: Preparing the next generation of scholars for the information age*. <http://www.ndltd.org/pubs/nrin.pdf>, p.16.
- <sup>3</sup> Fox, Edward A., John L. Eaton, Gail McMillan, Neill A. Kipp, Laura Weiss, Emilio Arce, and Scott Guyer. 1996. National Digital Library of Theses and Dissertations: A scalable and sustainable approach to unlock university resources. *D-Lib Magazine*, September. <http://www.dlib.org/dlib/september96/theses/09fox.html>
- <sup>4</sup> Fox, Edward A., Robert Hall, and Neill Kipp. 1997. *NDLTD: Preparing the next generation of scholars for the information age*. <http://www.ndltd.org/pubs/nrin.pdf>, p.2.
- <sup>5</sup> McMillan, Gail. 1999. The evolving genre of electronic theses and dissertations. *32nd Hawaii International Conference on System Sciences*. Based on proceedings prepared by Edward A. Fox, Gail McMillan, and John L. Eaton. <http://scholar.lib.vt.edu/theses/presentations/Hawaii/ETDgenreALL.pdf>, Table 3.
- <sup>6</sup> Fox, Edward A., John L. Eaton, Gail McMillan, Neill A. Kipp, Paul Mather, Tim McGonigle, William Schweiker, and Brain DeVane. 1997. Networked Digital Library of Theses and Dissertation: An international effort unlocking university resources. *D-Lib Magazine*, September. <http://www.dlib.org/dlib/september97/theses/09fox.html> Section 3.2
- <sup>7</sup> Fox, Edward A., Robert Hall, and Neill Kipp. 1997. *NDLTD: Preparing the next generation of scholars for the information age*. <http://www.ndltd.org/pubs/nrin.pdf>, p.2.
- <sup>8</sup> McMillan, Gail. 1999. The evolving genre of electronic theses and dissertations. *32nd Hawaii International Conference on System Sciences*. Based on proceedings prepared by Edward A. Fox, Gail McMillan, and John L. Eaton. <http://scholar.lib.vt.edu/theses/presentations/Hawaii/ETDgenreALL.pdf>, p.2.
- <sup>9</sup> McMillan, Gail. 1999. The evolving genre of electronic theses and dissertations. *32nd Hawaii International Conference on System Sciences*. Based on proceedings prepared by Edward A. Fox, Gail McMillan, and John L. Eaton. <http://scholar.lib.vt.edu/theses/presentations/Hawaii/ETDgenreALL.pdf>, Table 8.
- <sup>10</sup> McMillan, Gail. 1999. The evolving genre of electronic theses and dissertations. *32nd Hawaii International Conference on System Sciences*. Based on proceedings prepared by Edward A. Fox, Gail McMillan, and John L. Eaton. <http://scholar.lib.vt.edu/theses/presentations/Hawaii/ETDgenreALL.pdf>, Table 1.
- <sup>11</sup> Fox, Edward A., John L. Eaton, Gail McMillan, Neill A. Kipp, Paul Mather, Tim McGonigle, William Schweiker, and Brain DeVane. 1997. Networked Digital Library of Theses and Dissertation: An international effort unlocking university resources. *D-Lib Magazine*, September. <http://www.dlib.org/dlib/september97/theses/09fox.html> Section 3.
- <sup>12</sup> Theses Circulating from University Libraries, Virginia Tech as of Feb. 1996 and Feb. 1998. <http://scholar.lib.vt.edu/theses/data/Tcircs98.pdf>
- <sup>13</sup> Dissertations Circulating from University Libraries, Virginia Tech as of Feb. 1996 and Feb. 1998. <http://scholar.lib.vt.edu/theses/data/Dcircs98.pdf>.
- <sup>14</sup> McMillan, Gail. 1999. The evolving genre of electronic theses and dissertations. *32nd Hawaii International Conference on System Sciences*. Based on proceedings prepared by Edward A. Fox, Gail McMillan, and John L. Eaton. <http://scholar.lib.vt.edu/theses/presentations/Hawaii/ETDgenreALL.pdf>, p.7, Tables 4-9.
- <sup>15</sup> McMillan, Gail. 1999. Perspectives on electronic theses and dissertations. *New Frontiers in Grey Literature: Fourth International Conference on Grey Literature*, p.6. <http://scholar.lib.vt.edu/staff/gailmac/presentations/GL99ETDpaper.pdf>

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