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The Role of Penn State in Promoting
Intellectual Property Rights through eTDs
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1. INTRODUCTION

The publication of electronic theses and dissertations (eTDs) has gained a new currency in academic publishing. Submitting theses or dissertations as paper copies is gradually disappearing. Archived copies in university libraries have limited accessibility to readers (The Penn State University, 1998), but theses or dissertations presented on the web are more widely available. But that is a mixed blessing.

Soete (1998) has raised several concerns regarding Intellectual Property Rights (IPRs) including "ownership by the students and sponsorship by the university may seem to simplify the problems." There are some concerns that academic distribution channels or the peer review process can or could be circumvented. On the one hand, it seems a brilliant idea to place theses and dissertations on the web so that they are more widely available. On the other hand, the same idea may raise issues like plagiarism and the premature distribution of research material. Several publishers regard eTDs as previously-published work (Soete, 1998). Controversy swirls about eTDs.

The goal of the paper is to review the efforts made at Penn State University to publish theses and dissertations through digital means. Though it is a work in process and the implementation of eTDs is not complete, this discussion will raise key questions and issues for investigation in electronic publication of theses and dissertations. In this paper, the researcher will identify the current situation of eTDs at Penn State using the Graduate School Data together with interviews of the key players in the implementation of eTDs and for promoting intellectual property rights.

eTDs can open doors for academics, researchers, and practitioners to become partners in the Committee on Institutional Cooperation (CIC) universities. Joint efforts can develop a reservoir or repository of information from the scholarly contribution of students after they graduate from institutions of higher learning. These efforts can support students in achieving their career goals in a global and technologically-advanced competitive market.

2. DEFINITIONS
2.1. Intellectual Property Rights (IPRs)
IPRs at Penn State are defined as, "Managing, protecting, and licensing the intellectual property of faculty, graduate student, and staff at all Penn State locations."[1]

According to Wikipedia, "IP is a broad entitlement extending the concept of property beyond its materialist definitions to include information, ideas, and other intangible assets in their expressed form. Depending on jurisdiction, IP rights generally enable the holder to exercise exclusive rights over the subject matter (or "work") of the IP using copyright, patent, trademark and similar legal protections. The term reinforces that such works are the product of the mind or intellect and that any rights may be protected at law in the same way as any other form of property."

A leading international law organization named, The World Intellectual Property Organization (WIPO) defines that the word Intellectual Property in case of Copyright is applied to the creation in the fields of literature and arts with such work able to expressed as words, symbols, music, pictures, three dimensional objects, or combinations thereof (as in the case of an opera or a motion picture) [2]

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[1] See the IPR: http://www.research.psu.edu/ipo/index.html
[2] See the detail: http://www.iploft.com/Nanotechnology.pdf.

2.2. ETDs

The pioneer of eTDs was Virginia Tech University, which started eTDs for its students in January1997. According to a leading researcher of eTDs, George Soete, (1998) "ETDs are digitally produced, archived, and accessed theses and dissertations." Currently, there are 7956 number of eTDs and availability according to three options: 5173 Unrestricted, 2635 Restricted, and 146 Mixed. These eTDs can be accessed by authors and Department by visiting the website. [3]

An ETD (Electronic Thesis or Dissertation) is a digital document suitable for machine archives and worldwide access. It may incorporate such features as enhanced graphics, sound, and animation. In addition, eTDs enable users to perform comprehensive searches using words, phrases, or symbols. As of May 19, 2006, there are 231 members: 201 member universities (including 7 consortia); 30 institutions belong to the Networked Digital Library of Theses and Dissertations (NDLTD). Kushokowski (2005) stated s that the Virginia Tech Library Website maintains extensive links to available eTDs including technical information for eTD authors, and links to other resources (p. 3).

2.3. Copyright

Copyright is the legal protection of intellectual property. When an author creates an original work in the form of thesis or dissertation, the U.S. law gives the rights of ownership under the Copyright Act of 1976. These rights protect the author of an electronic thesis or dissertation against infringement ownership rights to print, reprint, copy, sell and prepare derivative work on their own work.[4] The thesis Office describes limitations on the authors' exclusive rights. Such as UMI has the right to sell copies of the theses and dissertations in and from microfilm or electronic format.

According to Bastani and Fernandez, (n.d.),"Copyrights protect the original expression of an idea. By offering protection, copyright encourages the expression of original, artistic ideas into a tangible medium. Legal protection is affected instantly, when the original copyrightable subject matter is fixed into a tangible medium, e.g. on paper or in a digital storage form."(p.2).

They explained the benefits of copyrights as more inexpensive and expediently obtained than the other types of protections such as patents, trade secrets, tradeworks, and trademarks. Copyrights are valid for the author's lifetime plus 50 years. A longer period of validity (75/100 years) applies if the creation was work made for hire, which is generally the case in the nanotechnology industry.

Copyright is a set of exclusive rights granted by governments to regulate the use of a particular expression of an idea or information. At its most general, it is literally "the right to copy" an original creation. In most cases, these rights are of limited duration. The symbol for copyright is ©, and in some jurisdictions may alternately be written (c).

Penn State has the right to make single copies of the theses and dissertations for nonprofit purposes. The author of an electronic thesis or dissertation is the copyright holder and owns the intellectual property of their eTDs.

3. METHODOLOGY

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[3] DetailS can be seen on the website http://scholar.lib.vt.edu/theses/browse/by_department/.

[4] Within the United States, authors have rights protected by law particularly US Code, Title 17, especially section 106. Authors get to decide how their works will be reproduced, modified, distributed, performed in public and displayed in public. An author may use another's work with certain restrictions known as "fair use" (US Code, Title 17, sect. 107). The four factors of fair use that must be considered equally are: (1) purpose and character of use; (2) nature of the copyrighted work; amount and substantiality; and (4) effect. In the United States, libraries are also considered in the same copyright law under section 108.

The Graduate school at Penn State has taken steps to implement eTD publishing in different phases so as to venture into this relatively unknown territory cautiously. This paper will be based on a two-fold research process:

Phase 1
The research paper has used Penn State's database to discover trends in eTDs among different colleges over the years. The research questions guiding this paper were as following:

1. What is the current status of eTDs by semester at Penn State over the last five years?
2. What is the current availability of eTDs by semester and college during Spring 2006?

Phase 2
The researcher conducted interviews of eTD Committee members directly involved in implementing eTDs and the researcher also spoke with Faculty advisors and graduate student who have submitted and participated in the eTDs process. These open-ended, exploratory interviews yielded insights into Penn State experience with eTDs. The two central questions that guided the interviews were as follows:

1. How did these individuals work to make the introduction of eTDs a successful effort?
2. What challenges have they faced, and are they facing, in this process?

The interview results were analyzed using a qualitative approach.

4. BACKGROUND
The Penn State eTD program began as a pilot in the fall of 1998 with doctoral dissertations only. Since its inception, over one-thousand dissertations have been submitted and posted on-line. The Penn State eTD program joined NDLTD sometimes in 2000 when the eTD program was made available to all doctoral candidates.[5]

The key administrative players in the process of the eTDs' implementation are the Penn State Graduate School, the University Libraries, and the Graduate Faculty. Moreover, graduate students conduct research and create the scholarly writing. The thesis office (a division of Graduate Enrollment Services) is the branch of graduate school at Penn State has started accepting dissertations on-line.

One of the female active members who has 5-10 years of working experience in the field of eTD mentioned, the importance of the collaborative efforts between the different University departments. She noted, "The Graduate School Thesis Office is responsible for the regulating submission specs, certifying theses, and handling receipt of theses and paper work for publishing. Penn State's ITS offers workshops on using the thesis software and eTD production. The university library is responsible for cataloguing, preserving, and providing access to the thesis after the thesis has been accepted, approved and the candidate has graduated. The Libraries Computing Services mounts and archives the eTDs." In case of electronic publishing, the eTDs will be uploaded to ProQuest/UMI after the date, the degree is conferred to the student if no restriction involved.

4.1.1. Current Status
Currently, graduate students are submitting their theses and dissertations on-line. Figure 1 shows the trend of eTD submission in last five years have persistently increased. In 2005, the number of eTD submission was the highest, a total of 403 eTDs were submitted during that year. To date, eTD has received over 1,000 submissions.

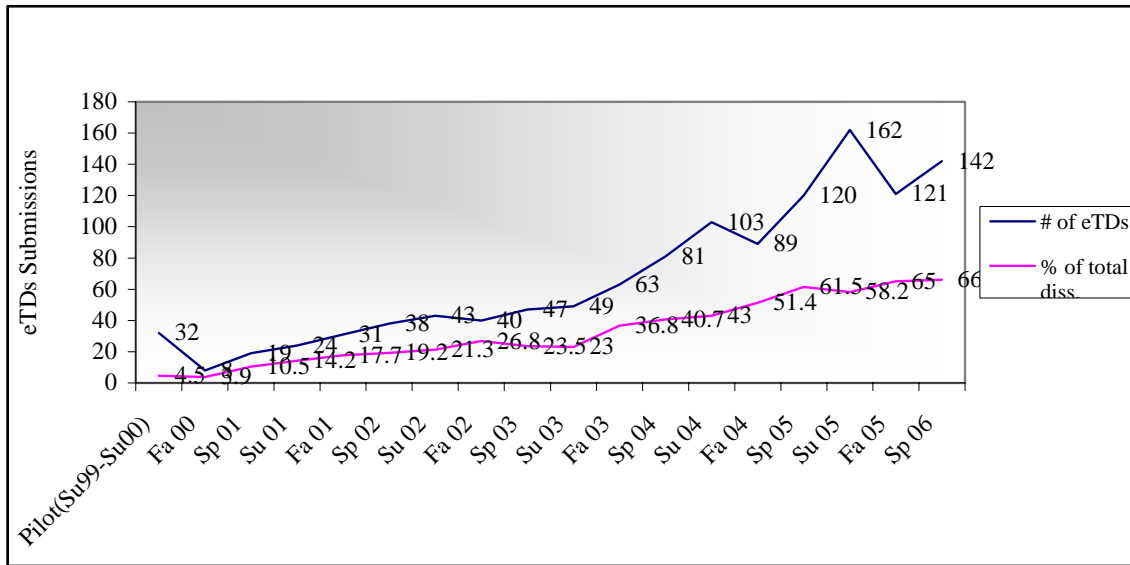[5] More information about the program is available from the web site http://etd.psu.edu

Figure 1. Penn State eTDs Submissions by semester from Su1999-Sp2006

4.1. 2. eTD Availability Options

Penn State has provided three options for students to distribute their scholarly work, including the option of restricting the access to the campus community for a period of two years, or denying access altogether for a period of two years for patent and/or proprietary purposes. After two years unless a written request is received for extension, the work will be released automatically for access to worldwide. The electronic theses and dissertations (eTDs) has been available to doctoral candidates at Penn State since the fall semester 2000. About 70% of doctoral students are submitting electronically by choice. However, this is not mandatory for masters-level students at this point. However, the full on-line submission of dissertations will be mandatory by the fall 2006 for the doctoral candidates.
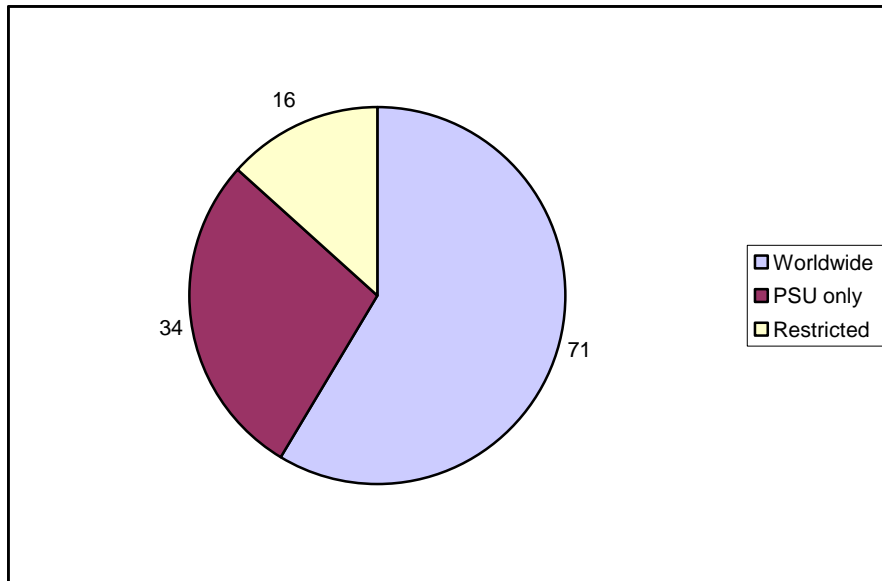

Figure 2. Penn State ETD availability in Spring 2006
Source: The Graduate School Thesis Office, Penn State University, 2006

4.1.3. Trends of eTD Submission by College

It is obvious that the graduate students from Engineering, science and Education departments is the most predominant group submitting their theses and Dissertations on-line as compared to others.
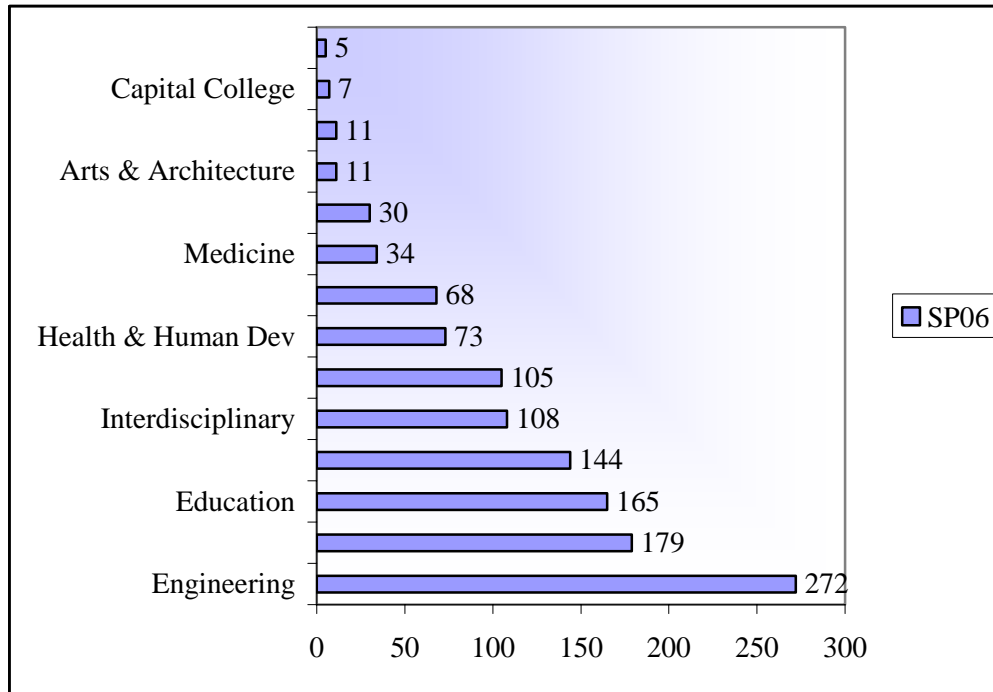

Figure 3. Penn State ETD submissions by college.
Source: The Graduate School. Penn State University.

4.2.1. eTD Training and Technical Support

In order to facilitate the eTD submission process, graduate students to be technically savvy enough to submit their dissertations on-line, they must be properly trained, and have access to software, training, technical assistance, and properly equipped computer labs. Additionally, students must be familiar with the technology in order to more creative in their scholarly communication, and must understand the importance of protecting intellectual property rights.

In order to achieve the goal of full implementation of the eTD initiative, Information Technology Services (ITS) has provided full support. In addition to classroom training, ITS has provided free access to software to graduate students via their website. The Penn State software package called PsuThesi for Word is a collection of Microsoft Word templates containing interactive tools to produce a Penn State Scholars' paper according to the guidelines set forth by the Thesis Office. Versions of the software are available for both Windows and Macintosh operating systems. Since 2004, ITS has also offered two seminars related to this eTD software: "PsuThesi: Thesis Templates for Microsoft Word" and "Adobe Acrobat."

Interestingly, students' attendance is relatively higher in Fall and Spring semesters, and attendance in the PSU thesis seminar is higher than attendance in the Adobe Acrobat seminar. The graduate school has provided a wider dissemination of PsuThesi software among the graduate students.
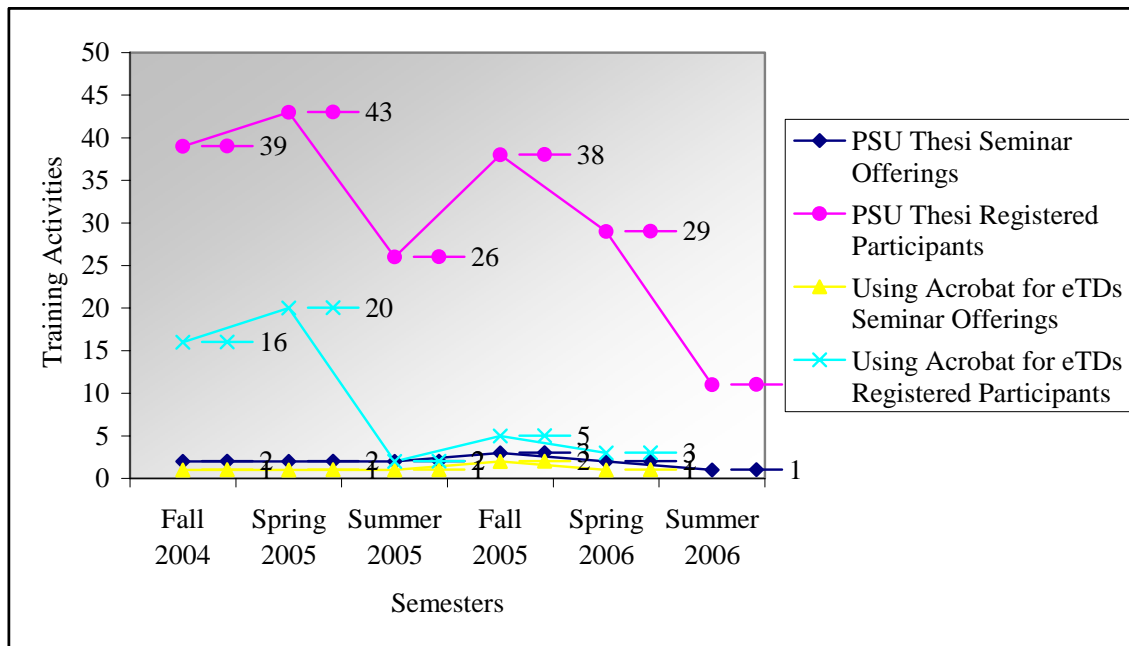
Figure 4. Training activities related to eTDs by semester
Source: SemReg System, Training Services, ITS, Penn State University, 2006

In addition, Peer Trainers such as Student Technology Advisory Committee, Learning & Performance Systems Department in College of Education also conducts seminars to train the graduate students in the production of eTDs.

4.2.2. eTDs Format

The graduate school accepts the eTDs in the form of PDF, multimedia files.[6] It is important to note that the "final copy" of thesis is electronic one submitted to graduate office, and is archived in the university libraries. L. S. Kellerman talked about storage of electronic dissertations at Penn State the electronic dissertations are being stored as PDF files. Other formats might be used in the future. In addition to UMI, LCS provides the server and database to serve the eTDs to the world via the web. The database is regularly backed up to tape. No CDs. She cites B. MacEwan Personal Communication, November 16, 2000), "We have made a national level commitment to archive these [dissertations] I assume we are comfortable with the plan for archiving and migration and there is no confusion about whether or not we need to retain this information permanently" (Personal Communication, May 22, 2006).

5. INTELLECTUAL PROPERTY RIGHTS

5.1.1. Intellectual Property Institutional set up

Penn State has earned its name among the leading research universities in the United States. According to official source, its "total research budget is in excess of $638 million. This allocation aims to enhance research activities that generate volumes of information. This research is published in the dissertations, reports, presentations, and in the other formats such as the popular Research/Penn State Magazine. Discoveries and inventions with commercial potential, however, are protected prior to public disclosure. These, including patents, trademarks, copyrights, and know-how, are Penn State Intellectual Property.

Penn State has well-established Intellectual Property Office (IPO). The intellectual Property Office is a unit of the Research and Technology Transfer Organization under the Vice President for Research.[7]

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[6] The site for file formats that can be used for images and multimedia: http://www.cac.psu.edu/etd/howto/graphics.

[7] For further information, http://www.research.psu.edu/ipo/index.html

5.1.2. Copyright and UMI

The author of an electronic thesis or dissertation is the copyright holder and owns the intellectual property of their ETD. Penn State has the right to make single copies of the thesis and dissertation for nonprofit purposes. Every doctoral candidate must submit to the Thesis Office a signed UMI Doctoral Dissertation Agreement for granting ProQuest/UMI the right to reproduce and distribute the work, in whole or in part, in and from microfilm or electronic format. This agreement does not interfere with the author's rights as copyright holder. By signing this agreement, the UMI is liable to take action in case of any damage occurs due to copyright violation. In this fast learning academic environment, students need to be familiar with the rules of copyright that govern how intellectual property is legally protected.[8]

5.1.3. Terms and/or conditions to protect intellectual property rights and copyright issues

From the point of view of a copy right expert, "Intellectual property rights of dissertation will depend upon agreement within College, and between student and advisor. If discovery is made during research process, PSU may retain intellectual property rights to any patentable discovery. This would depend upon policy, funding of research, etc. This would also determine level of access provided to dissertation during the initial years after graduation." She explains further, "Dissertations themselves are accessible in three ways: open, PSU only, or unavailable. Student makes access determination at time of submission. After a certain number of years, all dissertations will be made openly available. Responsibility for protecting copyright of third-party materials within dissertation lies with student. Graduate School and libraries would need to be notified if permission to use such materials in an eTD has not been cleared, so it can be removed prior to posting."

An active eTD member mentioned that "Copy right of content remains with the author."
A doctoral student mentioned that, "I submitted a copyright permission letter for my published chapters from the publishers that own the copyright and noted such in the preface and chapter footnotes. They were required."

One of the ITS instructors with three years of experience mentioned that library provides a host to meet the costs. An active eTD member says that doctoral candidates pre-pay the cost for processing eTDs. The eTD cost is $70 compared to the paper print dissertation processing of $85.

5.2.1. Publication

One of the major concerns for many graduate students is to get acceptance from publishers of their electronic research work in the form of books and/or articles in Journals. The interview conducted at Penn State Press gave important insight in this perspective:

> The question of publisher who has been asked to consider putting out the revised dissertation in book forms. It is going to ask the whole word has already seen your dissertation. So what is the value of putting out in print book spending asking us to spend 20 to30, 000 dollars to put your book as the print forms? You know 90% of it has already been available that is a really tough question. Early on, there were a lot of mixed responses from both journals and book publishers about how they were to be reacted. Some journals publishers consider that this would be considered the equivalent of the regular publication. They would not accept submissions that were already been broadcast the world in this way.

5.2.2. Patentability

The question about the effects of patentability of ideas has become sensitive. This has become disadvantageous for graduate student to get published their electronic submissions. One of the interviewee suggested that "the dissertations in particular those fields in which patents are very important. They were advised not to allow wider access outside the university and sometimes not even within the university. Once the idea becomes published in that way, you lose the opportunity to patent".

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[8] For more information on creating eTDs for publishing. Visit this website: http://etd.psu.edu/publish.html

S. After eTDs, the libraries are considering to change their decisions not to buy the books which have already been published on-line. One of the interviewed opined, "We have to know how they are thinking about and what they are buying in order to figure out, what specific for us to publish. We do not want to put a lot of our resources in to publishing the books they are not going to buy. Because they think that they are buying the same thing twice.

Students, their faculty advisors, and committees must be aware of the publication practices in their respective fields. While many publishers feel that thesis/dissertation dissemination via an eTDs Digital Library does not constitute prior publication, some publishers will not accept works that have been made available through the Penn State Digital Library. Other publishers will not allow material that has been published in their journals to be disseminated an eTDs via an eTDs digital library.

Therefore, the journal/book publication based upon the respective thesis or dissertation will most likely be very different than what is contained in master thesis or doctoral dissertation. This difference can be the deciding factor in what a publisher and or editor will publish. However, it is the student's responsibility to seek input from publishers regarding publication policies.

Penn State has published the eTDs in the form of books keeping in view that there is new enough in the book to make the dissertation worth publishing. Penn State publishes revised dissertations but certainly, a lot more careful about which one to publish that make initial exchange of information a difference between the two as a part of the process. If the authors have gone up to a certain point and the book will carry the story forward for another decade in the world. It also has value above and beyond dissertation and value of substance; it is not the matter of style.

6. ETD MILESTONES AND FUTURE GROWTH

In order to get insight into the experience of key players to protect intellectual property rights through the eTDs Initiative, the respondents reported their thoughts about the efforts and the challenges of implementing eTDs.

6.1.1. Achievements
There are interesting findings with the full implementation of eTD submissions. From faculty point of view the eTD submissions will help to achieve wider dissemination of dissertations, save space, save money and enhance creativity. R. S. Albitz described enthusiastically, "for the libraries eTDs save space, enhance services, and provide access to other researchers. [For libraries, this process saves] money as related to staff time, managing the print binding of theses. UMI is still microfilming for preservation purposes." (Personal Communication, May 17, 2006)

Moreover, an active committee member, S. Thatcher, suggested several overarching goals: "One of the goals is simply for the students is learning experience going through and creating and getting familiar of working with electronic documents. So It was partly expansion of their own educational experience because as they go on and become scholars in their fields and pursue other things. They have to deal with electronic documents a lot. So it is good idea for them to get to know at this stage and get to being comfortable with feeling the environment and certainly wider dissemination has always been the goals of the libraries to increase the utilities of these dissertations to provide a way to access more, and cited more in their research and certainly save space." He further stated, "eTDs is just exchanging from one set of cross to another technology cross. You have to keep up the technology aspect. So the cost is just equal to the cost of printing. [He thinks that] it does not save any money" (Personal Communication, April 21, 2006).

6.1.2. Advantages
The faculty members aged more than 50 years have more than twenty years of experience argued that on-line publication will enhance accessibility and reduce the costs involved in it. A doctoral student aged 30 years

stated advantage," easy to fix last minute errors, save paper, wider dissemination. As compared to paper copy, it was cheaper." Librarian's point of view, "Advantages is broad dissemination, space and staff dollar savings. S. Thatcher described, "From the authors point of view it is obviously advantageous to have their work accessible and especially through Networked Library of Theses and Dissertations (NDLTD) where subject key words searches and everything enable the people to find out about their work and be able people to access and use it around the whole world. That would help them become known for their work in their specific field. In terms of viewers, promoting and publicizing about their original own research has been. It is a great value to do it in this way."(Personal Communication, April 21, 2006)

George Soete, He mentions several benefits of eTDS in his research. These are accessible from anywhere at anytime. The processing of eTDs takes less time for wider availability. The education of students in use of electronic technologies can help to enhance the quality of their publications by including multi media files. From libraries point of view, potential savings

6.1.3. Disadvantages
Disadvantages include issues about access and republication   Elsevier and others beginning to allow eTD content to be submitted for journal publication." Kellerman & Mugridge (2002) expressed their concerns for the long term preservation of eTDs such as that Electronic submissions may be in using eXtensible Markup Language (XML). XM is a tagged ASCII text that can be interpreted by non-proprietary "browser" for maximum readability. They suggested that student needs to be trained to submit their dissertations in various forms such as Word document and/or a PDF. According to P. Leathers that multimedia files using audios, videos, images are compressed and embedded into PDF files before final submission to Thesis Office ((Personal Communication, May 22, 2006).

One of the limitations of the Penn State eTD process is that UMI, the distributor of eTDs, only distributes eTDs in black and white. Furthermore, there are not guidelines related to color in eTDs production. Therefore, different departments have been hesitant to participate in the eTDs submissions. During summer 2005, 110 paper dissertations were examined. S. Kellerman pointed out that there are no guidelines related to colors according to PSU Thesis guidelines. She stated that color is one of the advantages to eTDs. The use of colors is essential for understanding the contents of their scholarly work. Therefore, the departments like engineering, architecture, arts were reluctant for their online submissions (Personal Communication, May 22, 2006).

While a graduate student mentioned the disadvantages of eTD," No shiny hardcover book in the library, need to understand formatting software and own PDF printing software (some are free, but not the good ones)." (Personal Communication, May 16, 2006).

6.2.1. eTDs: implications for Future
The foregoing discussion may lead us to draw some cautious conclusions. There is no doubt that eTDs have gained popularity in higher educational institutions, in general. The main goal is to unlock the potential of intellectual property and copy rights of graduate students. As we are well aware, the current generation is more receptive to participate in it due to familiarity with the new technologies. The utilization of these skills make the graduate students more creative and to be known in their areas of research. They are more inclined to participate in on-line publishing of their scholarly work on the web. It is important to bear in mind the goal behind eTDs initiative is the protection of intellectual property rights associated with research performed by the graduate student at Penn State University. Copyright as the legal protection of intellectual Property right gives ownership of authorship. All eTDs have an abstract available for world wide access, but students have choices on on-line availability; such as a) Worldwide, b) PSU only and c) Restricted. The eTDs initiative will bring about respect, recognition and protection to researchers for their knowledge sharing.

The Thesis Office, Information Technology Services and The Intellectual Property Right offices at Penn State are pursuing their mission to provide graduate students the necessary information regarding the use of copyright materials, training of eTDs software, and the necessary procedures involved in the dissertation process before final submissions.

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        Innovations in Electronic Theses and Dissertations*. (Washington, D.C.)
        Association of Research Libraries: 7.

Selected internet resources

Brigham Young University's website for definition of ETD http://etd.byu.edu/about.html
Networked Digital Library of Theses and Dissertations: http://www.ndltd.org/
OCLC's ETD website: http://www.oclc.org/research/projects/etd/index.shtm#team
Pennsylvania State University's ETD web site: http://www.etd.psu.edu/
Pennsylvania State University's ETD Cataloging Guidelines:
        http://www.libraries.psu.edu/iasweb/catsweb/digital/edtd.htm
Pennsylvania State University's Intellectual Property Office website:
        http://www.research.psu.edu/ipo/index.html
Pennsylvania State University's Thesis Guide (2006, January)
        http://www.gradsch.psu.edu/current/thesis.html
Pennsylvania State University's website for file formats:
        http://www.cac.psu.edu/etd/howto/graphics
U.S. Copyright Office Website: http://lcweb.loc.gov/copyright/
Virginia Tech ETD website: http://scholar.lib.vt.edu/theses/
Wikipedia Copyright issues the free encyclopedia
        http://en.wikipedia.org/wiki/Copyright

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