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Reconceptualizing Open Access to Theses and Dissertations

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RECONCEPTUALIZING OPEN ACCESS TO THESES AND DISSERTATIONS

Orit Fischman Afori¹ & Dalit Ken-Dror Feldman²

ABSTRACT

Theses and dissertations (TD) are academic research projects that are conducted by graduate students to acquire a high academic degree, such as a PhD. The perception of the written TD has evolved over the years, following changes concerning the purpose of advanced academic studies. Today, these academic fruits should meet a high standard of academic innovation, which is understood broadly as encompassing not only knowledge concerning basic science but also the knowledge that generates social and economic value for society.

The modern perception of TD has generated a call for their greater accessibility, as part of the Open Science movement. Nevertheless, in many countries around the world TD are not published in an open access format. While the normative basis for open access approach to publicly funded academic research is extensively discussed in the literature, there is a lack of legal and normative discussion concerning the special case of TD. The present study aims at filling this gap.

We argue that the essence of TD as unique outputs of academic research merits a special stance compelling the publication of these studies in open access format, subject to certain exceptions. This stance is underpinned by several arguments, which we develop in our study, based on historic and normative analysis. Moreover, we propose to establish a mandatory global policy and standardization regarding the publication of TD in designated repositories, open to the public, that would generate together an "open

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world wide web of TD." Such a global framework will facilitate the progress of science and promote the public good worldwide.

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INTRODUCTION

Open access to scientific publications has been at the heart of public policy discourse for two decades. Much has been written about the various models of open access, the problems they raise, and the possible solutions to them. Yet, there is no systematic discussion in the literature of the justification for adopting an open access publication policy, particularly regarding theses and dissertations (TD). The present study aims to fill this gap. It emphasizes the need to acknowledge TD as unique academic products, access to which merits a global custom-designed regulatory policy. The time is ripe for establishing an open worldwide web of TD.³

A thesis or dissertation is a “document which presents the author’s research and findings and submitted by him in support of his candidature for a degree or professional qualification.”⁴ The terms are used differently around the globe: in some countries, a “thesis” is the culmination of a course of study leading to a master’s degree, and a “dissertation” is the work required for a doctoral degree; in other countries, it is the reverse.⁵ We use the term “TD” to signify final written works required to qualify for advanced academic degrees.

To support our proposed argument for the need to differentiate TD from other research, we start by reviewing the historic development of TD and the evolution of their role in academic institutions. In the early days of medieval European universities, the function of advanced degree studies was to demonstrate the qualification of the student to become a university teacher, *i.e.*, a professor.⁶ The requirement of a final written study to obtain a doctorate or a master’s degree emerged in the 17th century.⁷ In time, the role of advanced academic degrees has evolved also into training the cadre of future scholars, *i.e.*, researchers, and the requirements for obtaining the highest academic degree became stricter. The academic threshold of written TD had to meet strict requirements of originality, contribution to the scientific field, and demonstration of ability to conduct independent research.⁸ At the same time, the role of university professors to supervise the conduct of advanced degree studies, culminating in the final written

³ There are various initiatives regarding comprehensive databases of academic research, but most are operated commercially. See, for example, the “Web of Science,” operated by

Clarivate, which is a private company. Clarivate, *Web of Science* <https://clarivate.com/webofsciencegroup/solutions/web-of-science/> (last visited May 22, 2022); Clarivate, *About Us*, <https://clarivate.com/about-us/> (last visited May 22, 2022).

⁴ ISO 7144 DOCUMENTATION – PRESENTATION OF THESES AND SIMILAR DOCUMENTS cl. 3 (INT’L ORG. FOR STANDARDIZATION 1986).

⁵ Brian Paltridge, *Thesis and Dissertation Writing: An examination of Published Advice and Actual Practice*, in 21(2) ENGLISH FOR SPECIFIC PURPOSES 125, 125 at footnote 2 (2002).

⁶ TERESA BRAWNER BEVIS, A WORLD HISTORY OF HIGHER EDUCATION EXCHANGE THE LEGACY OF AMERICAN SCHOLARSHIP 7 (2019).

⁷ David Bogle, *100 Years of the PhD in the UK*, PROC. OF VITAE RESEARCHER DEV. INT’L CONF., 1, 1 (2018).

⁸ Douwe D. Breimer, *Leiden Dissertations*, in HORA EST! ON DISSERTATIONS 7, 7, 9 (2005).

TD, became clearer.⁹ In the last decades, advanced degrees have evolved further with the emergence of the knowledge-based economy.¹⁰

At present, the emphasis of third-degree studies is not only on training future university teachers and researchers but also on preparing the professional workforce and training future leaders.¹¹ Therefore, the threshold of written final TD has been adapted accordingly, and new models and perceptions regarding the notions of contribution to the scientific field have been developed. But TD are still perceived as special products of advanced academic studies, which should meet strict standards certifying that the student is qualified for the highest academic diploma.¹²

The proposed argument is that TD, as special academic products, should be subject to a specially tailored policy enabling fully open access to the public. After describing the historical development of TD, we define our position within broader "open science" initiatives.¹³ A range of justifications supports the need to facilitate access to research, from return on public investment in the academic sector to the promotion of efficient academic research as a public good.¹⁴ Over the years, various initiatives have emerged under the agenda of open science, all of which are aimed at strengthening the democratic structure of the information society.¹⁵ Chief among these is the "open access" publication model, aimed at encouraging better access to research, including academic publications.¹⁶ The open access publishing model enables broad dissemination of academic publications at a low cost and may overcome the market failure associated with the commercial publication model, which has negative consequences for the development of science and the accomplishment of the goals of academia.¹⁷ The open access publishing model gained support from policymakers worldwide and was endorsed as an official EU agenda.¹⁸ The

⁹ Rosemary Deem & Shane Dowe, *The UK Doctorate: History, Features and Challenges*, in TRENDS AND ISSUES IN DOCTORAL EDUCATION: A GLOBAL PERSPECTIVE, 152, 153-54 (Maria Yudkevich, Philip G. Altbach; Hans de Wit. eds., 2020).

¹⁰ Yanhua Bao, Barbara M. Kehm & Yonghong Ma, *From Product to Process. The Reform of Doctoral Education in Europe and China*, 43(3) STUDIES IN HIGHER EDUCATION, 524, 526 (2018), DOI10.1080/03075079.2016.1182481, (last visited May 19, 2022).

¹¹ *Id.*

¹² *Id.* at 538-539.

¹³ Paul A. David & Paul F. Uhler, *Creating the Global Information Commons for Science* (2005), <http://www.codata.info/wsis/GICSI-prospectus.html>.

¹⁴ Lucie Guibault, *Owning the Right to Open Up Access to Scientific Publication*, in OPEN CONTENT LICENSING: FROM THEORY TO PRACTICE 137 (Lucie Guibault & Christina Angelopoulos eds., 2011).

¹⁵ YOCHAI BENKLER, *THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM* (2006).

¹⁶ See e.g. Lisa Phelps, Bernard A. Fox & Francesco M. Marincola, *Supporting the Advancement of Science: Open Access Publishing and the Role of Mandates*, 10 J. TRANSLATIONAL MED. 13 (2012).

¹⁷ Eric Priest, *Copyright and the Harvard Open Access Mandate*, 10 NW. J. TECH. & INTELL. 377, 385-87 (2012).

¹⁸ Martin Enserink, *In Dramatic Statement, European Leaders Call for 'Immediate' Open Access to All Scientific Papers by 2020*, SCIENCE (May 27, 2016), <http://www.sciencemag.org/news/2016/05/dramatic-statement-european-leaders-call-immediate-open-access-all-scientific-papers>.

initiative has had additional ramifications, stressing the need to leverage the potential function of institutional digital repositories. Institutional or even national repositories can function as appropriate systems providing access to the growing mass of knowledge and information, promoting the progress of science and serving the public interest.¹⁹ Institutional and national digital repositories play a central role in the overall open access agenda.

The various initiatives emerging under the umbrella of the open science movement have recently received a significant boost by the attempt to incorporate them into the human rights discourse.²⁰ A “right to research,” which encompasses various human rights interests, may serve as the common thread justifying an obligation to open academic research to the public.²¹

Given the growing awareness of the need for open access to academic research, especially through institutional repositories, and considering that TD are the product of unique academic research of particular importance, as is discussed in depth in the article, we examined current open access policies to TD worldwide, which vary from country to country. Despite awareness of the need to establish repositories that provide open access to TD, there is no standard or mandatory framework for such repositories, whether national or transnational.²² The main projects aimed at archiving TD and providing access to them are either private-commercial ones for pay, such as the ProQuest Dissertations & Theses Global,²³ or managed by civil society collaborations. The latter are available for free, but they are not a mandatory scheme.²⁴ The most prominent national TD project is the British EThOS system.²⁵ Although participation is not mandatory, most higher education institutions in the UK are taking part in it, and its success can be attributed to the fact that it is the product of a partnership of

¹⁹ JULIAN CRIBB & TJEMPAKA SARI, *OPEN SCIENCE: SHARING KNOWLEDGE IN THE GLOBAL CENTURY 1* (2010).

²⁰ Michael W. Carroll, *The Movement for Open Access Law*, 10 LEWIS & CLARK L. REV. 741 (2006).

²¹ See e.g., Christophe Geiger & Bernd Justin Jütte, *The Fundamental Rights Foundations of the Right to Research and their implications for Copyright Law in the EU (forthcoming)*; Sean Flynn, Christophe Geiger & Joao Pedro Quintais, *Implementing User Rights for Research in the Field of Artificial Intelligence: A Call for International Action*, 42(7) EURO. INTEL. PRO. REV. 393 (2020).

See also Stephanie Davis-Kahl, *The Right to Research Coalition and Open Access Advocacy: An Interview with Nick Shockey*, in COMMON GROUND AT THE NEXUS OF INFORMATION LITERACY AND SCHOLARLY COMMUNICATION 287, 289 (2013); Julia Gelfand & Irvine Catherine Palmer, *Weaving Scholarly Communication and Information Literacy*, in *id.*, at 1, 11 (2013).

²² See *infra* Part III A

²³ *Uncover the Undiscovered, ProQuest Dissertations & Theses Global* <https://about.proquest.com/en/products-services/pqdtglobal/>, (last visited May 14, 2022).

²⁴ See *infra* Part III A.

²⁵ *EThOS E-Theses Online Service*, <https://ethos.bl.uk/Home.do;jsessionid=284F69842D7CE683731F416C7BEBDA5C>, (last visited May 14, 2022).

academic libraries, which developed and implemented the system to meet an academic need.²⁶

Given the lack of a unified global standard, and to better understand current open access policies toward TD, we conducted a limited semi-empirical investigation to collect information. To this end, we circulated a questionnaire to librarians at universities in various countries. The survey aimed to provide an evidence-based perspective for our normative study. Our findings confirm that despite the growing awareness of the importance of an open access TD policy, no standard policy exists. We received responses reporting on a range of policies, in particular concerning the question of whether the TD repository is open to all or only to a limited community. In the US, there was some confusion about the status of ProQuest and its function as a national repository. Our survey covered 18 countries in North America, South America, Europe, Asia, Africa, and Australia. It revealed that although the open access TD policy is widespread, it is far from being a global uniform norm.²⁷

We argue that TD present a special case for the open science movement and publication format. TD are a unique output of academic research that meets the high standard of original contribution to science and innovation. As such, they play an important role in industry and merit special treatment, requiring their publication in open access format, subject to certain exceptions, in a designated institutional, national, or transnational repository. The goal is to establish a global network of TD repositories, an "open worldwide web of TD," that would serve the progress of science worldwide. Such policy should be applied globally, through international agreements or other international schemes.²⁸ In November 2021, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has adopted the Recommendation on Open Science,²⁹ which may be the appropriate framework for launching the proposed "open worldwide web of TD" initiative.

We bring several arguments in support of this position.³⁰ First, we propose to reconceptualize advanced degree studies as a "social contract" between the student and society that includes the full disclosure of the TD. A similar principle underlies patent policy, according to which the patentee gains exclusive right and in exchange should fully disclose the invention to the public, for promoting the progress of science and the public good.³¹ This arrangement may be extended to the domain of TD. Our argument is based on the understanding that an advanced academic degree provides the student with various social and economic benefits, which justifies a policy requiring the student to give something back to society. The argument that

²⁶ Jill Russell, Chris Awre, Anthony Troman & Paul Needham, *Ethos: A National OAI And Digitization Service For E-Theses In The United Kingdom* (2022), https://www.researchgate.net/publication/265000711_EThOS_a_national_OAI_and_digitisation_service_for_e-theses_in_the_United_Kingdom (last visited May 14, 2022).

²⁷ See *infra* Part III B.

²⁸ See *infra* Part IV A.

²⁹ <https://en.unesco.org/science-sustainable-future/open-science/recommendation>.

³⁰ See *infra* Part IV B.

³¹ 35 U.S.C. § 102.

applies to TD does not necessarily apply to routine academic research. Other reasons supporting the adoption of an open access TD policy stem from the application of the general justifications of the open science movement, with particular emphasis on TD. A prominent reason is public expenditure. The resources invested in graduate students' studies and their final research projects are immense.³² A significant part of these investments originates from public funds, therefore the final outcome of this academic effort should guarantee the return of investment to the public. The development of science requires access to existing knowledge, therefore the public expenditure argument supports a mandatory scheme of open access TD policy.³³ Other justifications stemming from the public expenditure reasoning include generating a fair and equal academic environment for all scholars, irrespective of the "strength" of their home institution. The academic environment is highly competitive, and an open access TD policy supports researchers from "down the stream" who may face significant challenges in accessing updated research.³⁴ Another related key reason is adherence to efficient innovation policy, which underlies the open science agenda. The open science movement is based on the understanding that knowledge and innovation develop in an incremental process. The basic justification for open academic science is particularly strong when it comes to TD, which are the product of a unique type of academic research, in which innovation is a prerequisite that is strictly examined.³⁵ Therefore, the access of researchers in all sectors to recent TD is essential for the efficient progress of science. These and other considerations discussed in depth in the article, support the proposition that there is a pressing public need to establish a structured and institutionalized global framework for mandatory open access TD policy based on designated repositories. Finally, we discuss potential barriers to our proposed model and suggest pragmatic means to overcome them.³⁶

The importance of the article lies in justifying the special treatment of TD as academic outputs that must be subject to a global open access policy for the benefit of society as a whole.

This article proceeds as follows: Part I reviews the historical development of TD and Part II the emergence of the open science movement. Part III describes the current policies worldwide to open access to TD and reports on a semi-empirical investigation that collected information on current policies in the matter around the world. Part IV delves into the theoretical justifications of a specially designed scheme for open access to TD. Part V discusses the various barriers to the proposed

³² See e.g., data regarding US academy: <https://nces.ed.gov/programs/coe/indicator/cue> (referring to the rising instruction expenses per full-time equivalent (FTE) student at degree-granting postsecondary institutions in the US).

³³ See *infra* Part IV B 2.

³⁴ See Ben Jongbloed, Hans Vossensteyn, Frans van Vught & Don F. Westerheijden, *Transparency in Higher Education: The Emergence of a New Perspective on Higher Education Governance*, in EUROPEAN HIGHER EDUCATION AREA: THE IMPACT OF PAST AND FUTURE POLICIES 441 (Adrian Curaj, Ligia Deca & Remus Pricopie eds., 2018).

³⁵ See *infra* Part IV B 2.

³⁶ See *infra* Part V.

model and the ways to overcome them. Part VI contains concluding remarks.

I. HISTORICAL AND NORMATIVE BACKGROUND OF THESES AND DISSERTATIONS

A. Historical Development of Theses and Dissertations in Academia Worldwide

The Muslim world was the first to introduce the notion of a “university” – the Arabic *madrasa*. These universities granted a diploma to document that the student had finished his studies and was therefore qualified to teach at the madrasa.³⁷ The oldest madrasa is the University of Karaouine, Fez, Morocco, established in 859 AD.³⁸ The first university in Europe, belonging to the Christian world, was established more than 200 years later in Bologna, Italy, in 1088.³⁹ In the early days of European universities, only the most capable were accepted to study, and the degree demonstrated that the scholar was qualified to become a lecturer, i.e., it functioned as a license (*licentia*, in Latin) to teach.⁴⁰ The terms “doctor,” “professor,” “magister,” and “dominus” all signified a certified lecturer at the University.⁴¹ For example, the University of Paris conferred the title of Master, whereas the University of Bologna conferred the title of Doctor.⁴²

Universities in Europe proliferated over the centuries, but the requirement of a written study to obtain a doctorate or a Master’s degree emerged only in the 17th century.⁴³ Earning a Master’s or a Doctor’s degree required scholars to participate in various oral disputes in which they had to demonstrate the ability to argue and manage the debates. After completing the advanced studies, to be accepted as qualified university teachers, the scholars had to participate in a ceremonial procedure consisting of two stages: the *Vesperie* – the last time the candidate played the role of a participant in the oral dispute, and the *Inceptio*, in which the candidate first took on the master’s role. These oral procedures came to be known as a “defense” of the candidate’s thesis that was presented in the dispute.⁴⁴ The first written disputes can be found around the year 1550 in Central Europe.⁴⁵

In the latter half of the 16th century, after the development of printing technology, universities in the Netherlands, Central Europe, and Scandinavia began to publish written disputes widely; in other parts of the

³⁷ BEVIS, *supra* note 6.

³⁸ *Id.*, at 35.

³⁹ *Id.*, at 37.

⁴⁰ *Id.*, at 38-9.

⁴¹ *Id.*, at 42.

⁴² Bogle, *supra* note 7.

⁴³ Breimer, *supra* note 8, at 7, 9.

⁴⁴ Olga Weijers, *The Medieval Disputatio*, in HORA EST!, *supra* note 8, at 23, 26-27.

⁴⁵ Joseph S. Freedman, *Disputations in Europe in the Early Modern Period*, in HORA EST!, *supra* note 8, at 30, 34, 36.

world, publication was less widespread.⁴⁶ The earliest documented disputes often did not specify the author's name; over the years, the respondent's name was added as the author of the dispute.⁴⁷ The length of the dispute gradually increased in early modern times.⁴⁸ Many universities collected these writings and at times traded them for studies from other universities to acquire greater knowledge for their students.⁴⁹ The idea of a written final work of a doctorate candidate, known today as a thesis or dissertation, emerged only in the 17th century.⁵⁰

It is not clear when the first Philosophy Doctor (PhD) degree was officially awarded, but the first records of such a degree are from Germany, from where it has gradually proliferated to the rest of the world.⁵¹ The PhD became the highest academic degree, and its purpose was to certify mastery of a subject-matter field and the performance of original research.⁵² In the US, the first PhD degree was granted by Yale University in 1861, following the German tradition.⁵³ In the UK, the first PhD awarded was at the University of Oxford, in 1917. Other universities in the UK followed the footsteps of Oxford soon thereafter.⁵⁴

Over time, the requirements for obtaining the highest academic degree became clearer and stricter. Writing the culminating work for a doctoral degree could take several decades, especially in the humanities. In the exact sciences, scholars generally spent fewer years on the written work, but it could still take close to a decade.⁵⁵ Today, research that qualifies for a doctorate culminates in the submission of a final written dissertation and may be completed within a few years. Nevertheless, the academic threshold remains high, as the written TD must meet strict requirements of originality, contribution to the field, and demonstration of ability to conduct independent research.⁵⁶

B. Theses and Dissertations as a Qualifying Threshold for Academic Acknowledgement

As noted, the perception of the written TD has evolved over the years, following changes in the purpose of advanced academic studies. In the early years of universities, the role of the doctoral degree was to train a small cohort of elite scholars in the search for pure knowledge and basic truth. The thesis or dissertation was therefore aimed at enriching the

⁴⁶ *Id.* at 36.

⁴⁷ *Id.* at 34.

⁴⁸ *Id.*

⁴⁹ Jos Damen, *Five Centuries of Dissertations in Leiden: A Mirror of Academic Life*, in *HORA EST!*, *supra* note 8, at 11, 13.

⁵⁰ Bogle, *supra* note 7, at 1.

⁵¹ G. DuS, *A question of Degrees*, (3451) 133 SCEINCE, 441 (1961).

⁵² *Id.*

⁵³ *Id.*

⁵⁴ Deem & Dowle, *supra* note 9, at 153-154.

⁵⁵ Damen, *supra* note 49, at 11; *See also* Freedman, *supra* note 45, at 30.

⁵⁶ Breimer, *supra* note 8, at 7, 9.

relevant field of study.⁵⁷ During this period, it was assumed that all doctoral researchers would pursue an academic career, therefore the dissertation also served to certify the candidate's qualification as a teacher in the university.⁵⁸

The development of doctoral degrees in the UK is of particular interest in view of the far-reaching reforms that were introduced over the years. In the early days, despite the long gestation of doctoral dissertations, there was only minimal supervision of the process over the research methods and training of the candidates.⁵⁹ It was not until after World War II that the supervision of doctoral studies in the UK began, and only in the 1970s and 1980s has a PhD degree become a key consideration in employing lecturers in British academies.⁶⁰ After World War II, the first university committees for advanced degrees have been established, providing financial support for researchers.⁶¹ As doctorate studies became more rigorous and the time needed for their completion remained long, many scholars dropped out of PhD programs.⁶² Consequently, reforms were introduced into the PhD degree training process, which was limited to three-to-four years for a full-time scholar and to six-to-eight years for a part-time one.⁶³ At the same time, the high standard required of the dissertations was maintained.⁶⁴ Another reform introduced in the UK in the 1990s acknowledged a new type of professional doctoral degree for students who wished to combine advanced academic studies with full-time professional work. The professional doctoral degrees combined training in traditional academic studies with a short practical thesis.⁶⁵ Thus, the perception of the purpose of a doctoral degree has preserved its origins as academic research aimed at producing new knowledge. Nevertheless, today greater emphasis is placed on applied knowledge of economic value, alongside contribution to society.⁶⁶

Today, the doctoral thesis or dissertation remains a research project conducted under the supervision of academic experts.⁶⁷ In some countries, there are clear regulatory guidelines for who can instruct doctoral research students, and clear guidelines for writing the dissertation and meeting the requirements for obtaining the degree.⁶⁸ Yet, the purpose of the doctoral degree has changed in the last decade as a result of profound social developments, chief among these being the emergence of the knowledge-based economy.⁶⁹ Today, the emphasis of doctoral studies is not only on training future university professors, but also on preparing the professional

⁵⁷ Deem & Dowle, *supra* note 9, at 165-167.

⁵⁸ *Id.*

⁵⁹ *Id.* at 153-54.

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² Bao, Kehm & Ma, *supra* note 10, at 533.

⁶³ Deem & Dowle, *supra* note 9, at 153-54.

⁶⁴ Breimer, *supra* note 8, at 9.

⁶⁵ Deem & Dowle, *supra* note 9, at 153-54.

⁶⁶ *Id.* at 172.

⁶⁷ *Id.*

⁶⁸ Bao, Kehm & Ma, *supra* note 10, at 526.

⁶⁹ *Id.*

workforce for all sectors of the economy and training future leaders for various societal functions.⁷⁰ Consistent with this shift in the purpose of doctoral degrees, the number of research students has increased greatly over the years.⁷¹ The process of leveraging the advanced academic studies for serving societal needs and supporting the knowledge-driven economy was strengthened by the European Bologna Process, which has reformed academic studies in the EU.⁷² The European Bologna Process has also emphasized, among other things, a new goal of academia in training students for the labor market and enhancing their employability in the innovation economy.⁷³

The evolving purpose of doctoral degrees led to the development of two types of doctoral studies: a research doctorate, following the traditional model aimed at contributing to knowledge in the relevant field of research; and a professional doctorate, aimed at training the professional workforce in various sectors, particularly in disciplines such as business administration, medicine⁷⁴, health support professions, education, engineering, and social work.⁷⁵ Thus, various professional fields have been awarding doctoral degrees, for example, DBAs in business administration and EdDs in education.⁷⁶ The transformation in the types of advanced degree studies has resulted in a shift in the knowledge produced in the course of doctoral research. Academic knowledge has expanded beyond pure theoretical thinking, adding an applied tier and building a closer connection with the needs of societal sectors outside of academia, including industry.⁷⁷ Evolution of the purpose of doctoral studies has not changed the basic requirement that the final TD should demonstrate a significant contribution to the relevant field of science, although the quality of the professional doctorates is controversial.⁷⁸ Today, the requirement of academic innovation is understood broadly to encompass not only knowledge of basic science but also the knowledge that generates social and economic value for society.⁷⁹

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *Id.* at 525.

⁷³ *Id.* at 526.

⁷⁴ Medical degrees are an exemption. The first medical degrees were recognized by the authorities around the year 1231 in Schola Medica Salernitana, Italy (though they were granted even before). As far as we know, however, no written final dissertation was needed as a prerequisite to obtain these degrees, *see* HASTINGS RASHDALL, *THE UNIVERSITIES OF EUROPE IN THE MIDDLE AGES* 75-86 (1895) https://lollardsociety.org/pdfs/Rashdall_Universities_vol1.pdf.

⁷⁵ Bao, Kehm & Ma, *supra* note 10, at 530-33. For further reading regarding the change in European perceptions of advanced academic studies, *see also* Berit H. Johnsen, *From Dr. Philos to PhD*, RESEARCH PROJECT PREPARATION WITHIN EDUCATION AND SPECIAL NEEDS EDUCATION: INTRODUCTION TO THEORY OF SCIENCE, PROJECT PLANNING AND RESEARCH PLANS 80 (Berit H. Johnsen ed., 2013).

⁷⁶ Bao, Kehm & Ma, *supra* note 10, at 530-33.

⁷⁷ *Id.*

⁷⁸ *Id.* at 538-39.

⁷⁹ *Id.* at 530-33.

II. OPEN SCIENCE, OPEN ACCESS, AND THE RIGHT TO RESEARCH

Initiatives aimed at enhancing access to academic research should be examined in the broader context of the social movements pertaining to open science and open access, which have emerged in recent decades.⁸⁰ These movements are part of a larger idea of free culture that balances the free flow of information with proprietary rights.⁸¹ Together, these ideas are part of a global trend aimed at promoting the democratization of the information society,⁸² seeking to introduce the principles of fundamental rights into additional domains of modern civic life.⁸³ The background of these openness initiatives and their basic underlying principles are discussed below.

A. The Open Science Movement

Many studies have stressed the importance of openness in science and the accessibility of research to foster scientific development and encourage innovation, which promotes economic growth and the public good.⁸⁴ Access to prior knowledge is essential for maintaining a thriving academic culture. Open science is a broad notion that includes a series of initiatives aimed at encouraging open access to research and information. The common basis for all initiatives included under the umbrella of open science is the principle that the results of scientific research should be fully available, therefore legal and other barriers to their accessibility should be removed.⁸⁵ The open science agenda calls for restoring the underlying

⁸⁰ For the gift exchange economy theory, see STRING VEST MAUSS, *THE GIFT: THE FORM AND REASON FOR EXCHANGE IN ARCHAIC SOCIETIES* (W. D. Halls trans., 1990). See also MARK ANDREW HILL, *SOCIAL ORGANIZATION AND EXPANDING NETWORKS OF INTERACTION IN THE WESTERN GREAT LAKES ARCHAIC* (2012); Yochai Benkler, *Sharing Nicely: On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production*, 114 YALE L.J. 273 (2004).

⁸¹ LAWRENCE LESSIG, *FREE CULTURE: HOW BIG MEDIA USES TECHNOLOGY AND THE LAW TO LOCK DOWN CULTURE AND CONTROL CREATIVITY*, xvi (2004).

⁸² BENKLER, *supra* note 15; Lisa von Wiegen & Shannon M. Oltmann, *A Different Democratic Divide: How the Current U.S. Online Court Record System Exacerbates Inequality*, 112 LAW LIBR. J. 257, 257-258, 260 (2020).

⁸³ See, e.g., Janet Elizabeth Hope, *Open Source Biotechnology* (Dec. 2004) (unpublished Ph.D. dissertation, Australian National University), <http://ssrn.com/abstract=755244>; David W. Opperbeck, *The Penguin's Genome, or Coase and Open Source Biotechnology*, 18 HARV. J. L. & TECH. 167 (2004); Andrés Guadamuz Gonzáles, *Open Science: Open Source Licenses in Scientific Research*, 7 N.C. J.L. & TECH. 321 (2006).

⁸⁴ Annie Brett, *Information as Power: Democratizing Environmental Data*, 2022 UTAH L. REV. 127, 165 (2022); Anna Berti Suman & Robin Pierce, *Challenges for Citizen Science and the EU Open Science Agenda under the GDPR*, 4 EUR. DATA PROT. L. REV. 284, 286-88 (2018); Paul A. David, *The Economic Logic of "Open Science" and the Balance between Private Property Rights and the Public Domain in Scientific Data and Information*, in *THE ROLE OF SCIENTIFIC AND TECHNICAL DATA IN INFORMATION IN THE PUBLIC DOMAIN: PROCEEDINGS OF A SYMPOSIUM 19* (Julie M. Esanu and Paul F. Uhlir eds., 2003); David & Uhlir, *supra* note 13.

⁸⁵ Stephan Leible, Steffen Schlager, Moritz Schubotz & Bela Gipp, *A Review on Blockchain Technology and Blockchain Projects Fostering Open Science*, 2(16)

ethos of academia, which reflects the values of a universal, original, and critical research community, i.e., an open community.⁸⁶ This ethos was enshrined in Newton's insight that "If I have seen a little further it is by standing on the shoulders of giants."⁸⁷ The main justifications for facilitating access to research are based on the need to increase the return on public investments in the academic sector, promote efficient academic research, and thereby advance the public good and social wellbeing.⁸⁸ Restrictions on access to research, such as those stemming from intellectual property rights, may therefore limit the dissemination of data and knowledge and hinder the development of science and innovation.⁸⁹ In light of the rapid development of the information society in the last two decades, amplified by the digital environment, the open science movement has produced a comprehensive framework for developing a balanced policy concerning science.

The Access to Knowledge (A2K) movement has emerged, among others, as a result of the public struggle over the appropriate policy for research and development in the pharmaceutical market.⁹⁰ The A2K initiative gained support from less developed countries because it was perceived as a means of stressing that the interests and concerns of these countries should be taken into consideration while designing international intellectual property law. In 2007, the World Intellectual Property Organization (WIPO) undertook to promote access to knowledge and technology in developing countries to encourage creativity and innovation and to strengthen such activities within the framework of WIPO activities.⁹¹ This move focused public attention on the A2K discourse and

FRONTIERS IN BLOCKCHAIN 1, 2, 17, 21 (Nov 19, 2019) <https://doi.org/10.3389/fbloc.2019.00016>; M. Assante, L. Candela, D. Castelli, R. Cirillo, G. Coro, L. Frosini & F. Sinibaldi, *Enacting Open Science by D4Science*, 101 FUTURE GEN. COMP. SYSTEMS, 555, 555 (2019); Sönke Bartling & Sascha Friesike, *Towards Another Scientific Revolution*, in OPENING SCIENCE: THE EVOLVING GUIDE ON HOW THE INTERNET IS CHANGING RESEARCH, COLLABORATION AND SCHOLARLY PUBLISHING 3, 17 (Sönke Bartling & Sascha Friesike eds., 2014).

⁸⁶ David, *supra* note 84, at 19; David & Uhler, *supra* note 13.

⁸⁷ Who has based his words on the words of the philosopher Bernard de Chartres, see SCOTT TROYAN, *MEDIEVAL RHETORIC: A CASEBOOK*, 10 (2004).

⁸⁸ Vesna Zabijakin-Chatleska & Aneta Cekikj, *Attitudes and Practices of Data Sharing and Data Preservation among Social Science Researchers in the Republic of North Macedonia*, 15 BALKAN SOC. SCI. REV. 251, 253-256 (2020); Guibault, *supra* note 14.; WALT CRAWFORD, *OPEN ACCESS: WHAT YOU NEED TO KNOW NOW 1* (2011); Sheila Jasanoff, *Transparency in Public Science: Purposes, Reasons, Limits*, 69 LAW & CONTEMP. PROBS. 21 (2006);

⁸⁹ See e.g., Fiona Murray, Philippe Aghion, Mathias Dewatripont, Julian Kolev & Scott Stern, *Of Mice and Academics: Examining the Effect of Openness on Innovation*, 8 AM. ECON. J. ECON. POL'Y 212 (2016). Sascha Friesike, Bastian Widenmayer, Oliver Gassmann & Thomas Schildhauer, *Opening Science: Towards an Agenda of Open Science in Academia and Industry*, 40 J. TECH. TRANSFER 581 (2015).

⁹⁰ Lea Shaver, *Intellectual Property, Innovation and Development: The Access to Knowledge Approach*, in ACCESS TO KNOWLEDGE IN BRAZIL 1 (Lea Shaver ed., 2010); Amy Kapczynski, *The Access to Knowledge Mobilization and the New Politics of Intellectual Property*, 117 YALE L.J. 804 (2008).

⁹¹ The 45 Adopted Recommendations under the WIPO Development Agenda, recommendation 19 (2007), <http://www.wipo.int/ip-development/en/agenda/recommendations.html> ("To initiate discussions on how, within

brought to the forefront of public debate the safeguards that help less developed countries in protecting their interests in the international arena.⁹² Another achievement of the public discourse surrounding A2K is the growing call to take this movement one step further and acknowledge the principle of Access to Knowledge or Access to Information as a fundamental human right.⁹³ Thus, a new phase in the evolution of the A2K discourse focusing on human rights has emerged, and it will be discussed below in Part C.

The open science movement has been promoted also by UNESCO,⁹⁴ which launched several global initiatives regarding the digital environment aimed at enhancing international cooperation in education, arts, sciences, and culture.⁹⁵ In recent years, UNESCO has promoted several projects examining access to information worldwide.⁹⁶ In November 2021, it released its Recommendation on Open Science, the product of a consultation process with various stakeholders⁹⁷ that builds on previous recommendations regarding the digital information environment, such as the Recommendation on Science and Scientific Research (2017)⁹⁸ and the Recommendation on Open Educational Resources (2019).⁹⁹ The proclaimed goal of the Recommendation on Open Science is “to provide an international framework for open science policy and practice.”¹⁰⁰ This Recommendation elaborates on the principles of open science and enumerates how its goal may be achieved.¹⁰¹ The working groups delegated to discuss ways of implementing the Recommendation are taking their first steps.¹⁰²

WIPO’s mandate, to further facilitate access to knowledge and technology for developing countries and LDCs to foster creativity and innovation and to strengthen such existing activities within WIPO”).

⁹² Shaver, *supra* note 90; Kapczynski *supra* note 90; Jerome H. Reichman, *Intellectual Property in the Twenty-First Century: Will the Developing Countries Lead or Follow?*, 46 HOUS. L. REV. 1115, 1184–85 (2009).

⁹³ See also Lea Shaver & Caterina Sganga, *The Right to Take Part in Cultural Life: On Copyright and Human Rights*, 27 WIS. INT’L L.J. 637 (2010); Molly Beutz Land, *Protecting Rights Online*, 34 YALE J. INT’L L. 1, 44–46 (2009).

⁹⁴ UNESCO, <https://www.unesco.org/en>, (last visited May 22, 2022).

⁹⁵ UNESCO, *Communication and Information*, <https://www.unesco.org/en/communication-information>, (last visited May 22, 2022).

⁹⁶ *Id.*

⁹⁷ UNESCO, *Open Science*, https://en.unesco.org/science-sustainable-future/open-science/recommendation_ (last visited May 22, 2022).

⁹⁸ UNESCO, *Recommendation on Science and Scientific Researchers*, https://en.unesco.org/themes/ethics-science-and-technology/recommendation_science (last visited May 22, 2022).

⁹⁹ UNESCO, *Recommendation on Open Educational Resources (OER)* (Nov. 25, 2019), http://portal.unesco.org/en/ev.php-URL_ID=49556&URL_DO=DO_TOPIC&URL_SECTION=201.html

¹⁰⁰ UNESCO, *Recommendation on Open Science* (2021), <https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en>.

¹⁰¹ *Id.*

¹⁰² UNESCO, *Implementation of the UNESCO Recommendation on Open Science* (May 20, 2022), <https://www.unesco.org/en/natural-sciences/open-science/implementation>.

*B. The Open Access Publication Initiative and the Role of
Institutional Repositories*

The mechanism by which scientific progress is exposed to the academic community and which allows the incremental use of existing knowledge in future research is “publication.” Publications are a vital part of academic life. Scholars report their new findings in academic publications, which enables others to examine, critique, improve, and develop new knowledge based on prior disclosed knowledge. The open science movement has evolved into various initiatives aimed at encouraging better access to research, including academic publications. In many cases, these publications are not accessible because of the publishers’ commercial interests and enforcement of these interests by means of intellectual property rights or other legal restrictions, or because of the absence of academic policies supporting the dissemination of research.¹⁰³ In the 1990s, an outcry was raised against the lack of access to academic publications. It was prompted by the fact that a handful of international publishing corporations dominated the distribution of the most prestigious academic journals, and that subscription fees to scientific journals skyrocketed.¹⁰⁴ From a public interest perspective, this reality has created a market failure, which undermines the goal of academia in disseminating knowledge.¹⁰⁵ The open access publishing format that has emerged in response has grown significantly in the Web 2.0 era, and has thrived in recent years.¹⁰⁶

The open access publishing initiative was spawned backed by three declarations made in 2002-2003, known as the Berlin-Bethesda-Budapest declarations, which consolidated and formalized the open access movement.¹⁰⁷ The key elements of open access publishing, formulated in

¹⁰³ OECD, GIVING KNOWLEDGE FOR FREE: THE EMERGENCE OF OPEN EDUCATIONAL RESOURCES 82-83 (2007). The transfer of rights and awareness of researchers that they (and the institution) are the copyright owners of the scientific article, is poor. In 2002–2003, a questionnaire was sent to 542 researchers as part of the RoMEO project in the UK, in which they examined the rights that the authors want to keep for themselves in their study, which they seek to publish. Over 60% wanted other users to be able to view, print, and save their work, but not modify it, as long as the users give them credit. About 55% wanted to limit the use of their work only to non-commercial use and for educational purposes only. The project also showed that about 41% of researchers do not understand the meaning of transferring copyright ownership to a publisher. *Id.*

¹⁰⁴ Priest, *supra* note 17, at 385–87.

¹⁰⁵ Fiona Murray & Scott Stern, *Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge? A Test of the Anti-Commons Hypothesis*, 63 J. ECON. BEHAV. & ORG. 648 (2007).

¹⁰⁶ See, e.g., CRIBB & SARI, *supra* note 19; Phelps, Fox & Marincola, *supra* note 16; Bartling & Friesike, *supra* note 85.

¹⁰⁷ See The Budapest Open Access Initiative, The Howard Hughes Medical Institute, Bethesda Bethesda Statement on Open Access Publishing (June 20, 2003), <http://legacy.earlham.edu/~peters/fos/bethesda.htm>, and the Berlin Declaration, Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (Oct. 22, 2003), <https://openaccess.mpg.de/Berliner-Erklaerung>.

The first declaration of 2002 was initiated by a consortium of researchers, universities, laboratories, libraries, civil society organizations, journals, publishers, see <https://www.budapestopenaccessinitiative.org/read/>. The Bethesda statement was at the

these declarations, are that (a) research should be freely accessible worldwide, free of charge and without barriers; (b) use of the publications is permitted subject to attribution to the original journal in which research was published; and (c) publications should be immediately deposited in digital format in at least one database that is committed to open access principles in a long-term archive.¹⁰⁸ The open access publishing initiative sought to introduce a game-changer model into the commercial academic publications market. By facilitating broader dissemination of academic publications with lower costs, it aimed to overcome the market failure of the “behind paywalls” publication model.¹⁰⁹ Technological developments of the last decade, including the worldwide expansion of online connectivity, the growing capacities of digital storage, and the thriving information culture, have reinforced the desire to remedy the inaccessibility of research.¹¹⁰ The open access publishing agenda has gained official support from the EU Ministers of Science, Innovation, Trade, and Industry, who released a shared statement in 2016, according to which within several years all the outcomes of publicly funded research in the EU should be published in open access format.¹¹¹

The open access publishing initiative, together with the reasons for its emergence, has prompted additional debate, stressing the need to leverage the potential function of institutional digital repositories. Several reasons have led to the call to encourage academic publication in open access format and to include publications in institutional repositories that are open to the public. First, in the 21st century, when the quantity of academic information doubles every five years, there is a growing gap between the creation of scientific information and its sharing because most of the information remains unreachable to the general public.¹¹² To make the growing mass of knowledge effectively accessible, it is imperative to generate a comprehensive and efficient tool that makes it possible to reach this knowledge. Institutional or even national repositories can function as appropriate “gates” to the growing mass of knowledge and information.

result of a meeting held in April 2003 at the Howard Hughes Medical Institute. The purpose of the Bethesda statement was to stimulate dialogue in the research community on how the idea of open access can be promoted in the scientific literature. The Berlin Declaration was also signed by a consortium of researchers, universities, and other research and open access organizations.

See also How Should We Define “Open Access”?, SPARC OPEN ACCESS NEWSLETTER (Scholarly PubTheg & Acad. Nothing. Coalition), No. 64, Aug. 4, 2003, www.earlham.edu/~peters/fos/newsletter/08-04-03.htm.

¹⁰⁸ JOHANNES (JAN) J. M. VELTEROP, *OPEN SOCIETY INSTITUTE OPEN ACCESS PUBLISHING AND SCHOLARLY SOCIETIES: A GUIDE* 6 (2005).

¹⁰⁹ Chris Armbruster, *Cyberscience and the Knowledge-Based Economy. Open Access in the Natural and Social Sciences: The Correspondence of Innovative Moves to Enhance Access, Inclusion and Impact in Scholarly Communication*, 6 POL’Y FUTURES EDUC. 439 (2008).

¹¹⁰ Basil Ajith, *The Shift from the Copyright Regime to Free Culture* (Aug. 17, 2013), <http://ssrn.com/abstract=2311145>.

¹¹¹ Enserink, *supra* note 18.. *See also* Dagmar Sitek & Roland Bertelmann, *Open Access: A State of the Art*, in *OPENING SCIENCE: THE EVOLVING GUIDE*, *supra* note 85, at 139, 140-42.

¹¹² CRIBB & SARI, *supra* note 19; Phelps, Fox & Marincola, *supra* note 16.

Consolidating academic research within institutional or thematic repositories has many other advantages to the academic community and to the public interest, such as saving the production cost involved in the traditional publication process; reducing repetitive and overlapping research due to the ability to conduct a thorough search of existing studies; allowing focused and targeted exposure to updated research; fostering research collaborations; allowing immediate exposure of research; eliminating the long lead times of the traditional publication process; and focusing the attention of the academic community on new and updated knowledge.¹¹³ It has been argued that all these advantages of institutional or thematic repositories can facilitate progress in science and better serve the public interest.

Another prominent reason for establishing institutional repositories has to do with the return on public funding. The public expenditure on academic research has increased greatly in the last two decades worldwide,¹¹⁴ and the outcomes of these investments, namely academic research, should be fully accessible and free to the public.¹¹⁵ Finally, public research libraries, which are also supported by public funds, could fulfill their purpose by providing a better service to the public and facilitating access to greater knowledge.

The call to extend the role of institutional repositories as part of the general effort of the open access finds support in the argument that knowledge should be democratized and open to the general public, on a global scale, not only to the local scientific community. Ideally, the global scientific community should operate in an unconstrained environment that allows the free use of previous research, including the raw data used in the course of the research. It has been argued that such an open and free scientific environment serves the progress of science in all countries, guaranteeing access to knowledge to developing countries as well.¹¹⁶

C. The Rise of the Right to Research

The open science movement, the A2K, and the open access publishing initiatives have jointly called to incorporate all these notions within the framework of a fundamental right. It has been argued that access to knowledge should be acknowledged as a basic human right, derived from other already established human rights, first and foremost, freedom of speech.¹¹⁷ The nexus between open information, knowledge, and human rights has been extensively discussed by scholars, civil society

¹¹³ Rob Kitchin, Sandra Collins & Dermot Frost, *Funding Models for Open Access Digital Repositories*, 39 ONLINE INFO. REV. 664 (2015).

¹¹⁴ Patrick Gaulé & Nicolas Maystre, *Getting Cited: Does Open Access Help?*, 40 RES. POL'Y 1332 (2011).

¹¹⁵ *Id.*

¹¹⁶ See e.g., Kapczynski, *supra* note 90.

¹¹⁷ Lea Bishop Shaver, *Defining and Measuring A2K: A Blueprint for an Index of Access to Knowledge*, 4 I/S 235 (2008); Peter S. Menell, *Knowledge Accessibility and Preservation Policy for the Digital Age*, 44 Hous. L. Rev. 1013, 1042-1045 (2007).

organizations, and policymakers in the last two decades.¹¹⁸ Some American scholars have noted that the constitutional clause, giving Congress the authority to legislate intellectual property laws for the purpose of promoting the progress of science and of the useful arts, provides an anchor for adopting safeguards for access to knowledge as well.¹¹⁹ A more direct recognition of the existing relationship between information, knowledge, and human rights occurred in 1948, with the enactment of Article 27 of the Universal Declaration of Human Rights, which proclaims that "Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits."¹²⁰ This human right was further acknowledged in Article 15 of the International Convention on Economic, Social, and Cultural Rights, adopted in 1966.¹²¹ Therefore, access to knowledge as a human right may be also derived from the "third generation" human rights, headed by these recognized cultural rights, or even from the right to education.¹²²

The human rights discourse about the access-to-knowledge right has evolved significantly in recent years, and various specialized areas have developed within the human rights discourse. One such area is the newly emerging "right to research," an area of the right of access to knowledge that concerns the notion of research, which merits special attention.¹²³ As noted, scientific research is incremental, and therefore access to prior knowledge is essential for accomplishing the end goal of scientific

¹¹⁸ See, e.g., ELLEN COLLINS, CAREN MILLOY & GRAHAM STONE, GUIDE TO OPEN ACCESS MONOGRAPH PUBLISHING FOR ARTS, HUMANITIES AND SOCIAL SCIENCE RESEARCHERS (2015); CRAWFORD, *supra* note 88; CRIBB & SARI, *supra* note 19; CATHERINE JONES, INSTITUTIONAL REPOSITORIES: CONTENT AND CULTURE IN AN OPEN ACCESS ENVIRONMENT (2007); UMA KANJILAL & ANUP KUMAR DAS, UNESCO, INTRODUCTION TO OPEN ACCESS (2015), <http://unesdoc.unesco.org/images/0023/002319/231920E.pdf>; JOHN WILLINSKY, THE ACCESS PRINCIPLE: THE CASE FOR OPEN ACCESS TO RESEARCH AND SCHOLARSHIP (2006); Intekahab Alam, *Changing Role of Academic Libraries in Open Access Environment*, 4 J. LIBR. & INFO. SCI. 449 (2014); Eric Archambault, Didier Amyot, Philippe Deschamps Aurore Nicol, Lise Rebout & Guillaume Roberge, *Proportion of Open Access Peer-Reviewed Papers at the European and World Levels—2004–2011* (2013); Armbruster, *supra* note 109, at 424; Martijn Arns, *Open Access is Tiring out Peer Reviewers*, 515 NATURE 467 (2014); Charles W. Bailey, Jr., *What Is Open Access?*, in OPEN ACCESS: KEY STRATEGIC, TECHNICAL AND ECONOMIC ASPECTS 13 (Neil Jacobs ed., 2006); Carroll, *supra* note 20; Michael W. Carroll, *Why Full Open Access Matters*, 9 PLOS BIOLOGY e1001210 (2011); Alissa Centivany, *Paper Tigers: Rethinking the Relationship Between Copyright and Scholarly Publishing*, 17 MICH. TELECOMM. & TECH. L. REV. 385 (2011).

¹¹⁹ Margaret Chon, *Postmodern "Progress": Reconsidering the Copyright and Patent Power*, 43 DEPAUL L. REV. 97, 142–46 (1993); Menell, *supra* note 117, at 1042–45.

¹²⁰ G.A. Res. 217 (III) A, art. 27, Universal Declaration of Human Rights (Dec. 10, 1948).

¹²¹ G.A. Res. 2200 (XXI) art. 15, International Covenant on Civil and Political Rights (Mar. 29, 1967).

¹²² Antonija Petricusic, *Empowerment of the Individual under International Law*, 14 Croatian Int'l Relations Rev. 109, 112 (2008); Peter H. Kooijmans, *Human Rights—Universal Panacea? Some Reflections on the So-Called Human Rights of the Third Generation*, 37 Netherlands Int'l L. Rev. 315 (1990).

¹²³ Geiger & Jütte, *supra* note 21.

progress.¹²⁴ Therefore, the open science movement, and more particularly the call for accessible publication policy, may be based on the theoretical foundation of the right to research, as a basic human right.¹²⁵

III. THESES, DISSERTATIONS, AND OPEN ACCESS

A. *Current Trends in Open Access Approach to Theses and Dissertations*

Today, many universities worldwide require that TD be deposited in their library,¹²⁶ and in the past decade, they have also required an electronic copy.¹²⁷ Yet, submission of TD in an accessible format does not necessarily entail an open access policy. As discussed above, there is a growing discourse on the special role institutional repositories have in the open access initiative. Repositories operated on digital platforms enable universities to share resources and scientific information, making possible the convenient and well-organized preservation of scientific studies.¹²⁸ Digital repositories also enable full, easily handled, and low-cost access to academic knowledge and structured searches in the “sea of knowledge.”¹²⁹ If properly designed, they provide additional advantages in the preservation of academic studies,¹³⁰ increase the exposure of the studies contained in them, and ensure their long-term preservation.¹³¹

This potential function of university digital repositories can provide access to all academic “papers,”¹³² but TD merit special treatment within the repositories because of their different nature and function. Such treatment may include, for example, providing unlimited access to the TD by the general public, considering that academic repositories are usually sponsored by national authorities, and may therefore require different indexing from other academic studies, for easier detection and identification. Currently, TD are not open to the public in worldwide academia, nor are they classified as a distinct category (*e.g.*, in the “Web

¹²⁴ CRAWFORD, *supra* note 88; Jasanoff, *supra* note 88; T.L. Spires-Jones, P. Poirazi & M.S. Grubb, Editorial, *Opening Up: Open Access Publishing, Data Sharing, and How They Can Influence Your Neuroscience Career*, EUR. J. NEUROSCIENCE 1413 (2016).

¹²⁵ CRIBB & SARI, *supra* note 19; Phelps, Fox & Hire, *supra* note 16.

¹²⁶ Dillip K. Swain, *Global Adoption of Electronic Theses and Dissertations*, LIBRARY PHILOSOPHY AND PRACTICE 1 (2010)

¹²⁷ Marisa L. Ramirez, Joan T. Dalton, Gail McMillan, Max Read and Nan H. Seamans, *Do Open Access Electronic Theses and Dissertations Diminish Publishing Opportunities in the Social Sciences and Humanities? Findings from a 2011 Survey of Academic Publishers*, 74(4) COLLEGE & RESEARCH LIBRARIES 368-80 (2013).

¹²⁸ Jennifer Ann Stevenson and Jin Zhang, *A Temporal Analysis of Institutional Repository Research* 105 SCIENTOMETRICS 1491, 1521 (2015).

¹²⁹ Swain, *supra* note 126.

¹³⁰ *Id.*

¹³¹ Stevenson & Zhang, *supra* note 128, at 1522.

¹³² John Rigby & Barbara Jones, *Bringing the Doctoral Thesis by Published Papers to the Social Sciences and the Humanities: A Quantitative Easing? A Small Study of Doctoral Thesis Submission Rules and Practice in Two Disciplines in the UK*, 124 SCIENTOMETRICS 1387 (2020).

of Knowledge”).¹³³ There are also no international agreements or transnational standards on the matter, and no, and current policies relating to the accessibility to TD vary from country to country and from one institution to another.

Given the lack of international cooperation and of a uniform standard regarding the open access policy to TD, several non-state organizations have created the infrastructure for a global TD repository. For example, the Open Access Theses and Dissertations organization (OATD.org), operates a website for searching open access TD worldwide. The freely available TD come from 1,100 institutions worldwide. To date, the organization has indexed more than six million open TD.¹³⁴ Nevertheless, there is no clear definition of the exact type of open access policy that enables an institution to be included in this list. Several free databases are also beginning to index TD. A particularly large one, with over six million records and significant exposure to European research, is the Networked Digital Library of Theses and Dissertations (NDLTD).¹³⁵ The NDLTD is involved in activities aimed at promoting awareness of the importance of the accessibility of TD, holds symposiums on the matter, and has established a journal dedicated to fostering knowledge about access to TD.¹³⁶

Beyond these grassroots initiatives attempting to challenge the lack of global collaboration in building TD repositories, the lack of national policies is apparent. In the US, there is no unified federal policy as opposed to the 2016 declaration of the Ministers of Science in the EU, and it remains up to each institution to decide on the matter. For example, in 2020, the University of California, which has several campuses, has adopted a policy that “requires theses or dissertations prepared at the University to be (1) deposited into an open access repository, and (2) freely and openly available to the public, subject to a requested delay of access (“embargo”) obtained by the student.”¹³⁷ The policy further requires that “campuses must ensure that student ETDs are available open access via eScholarship (UC’s open access repository and publishing platform), at no cost to students,” and explains the advantages of the open access policy.¹³⁸ eScholarship is open for free to the general public.¹³⁹ As opposed to the University of California, the dissertations of Saint Louis

¹³³ *Id.*, at 1390.

¹³⁴ *Open Access Theses and Dissertations*, <https://oatd.org/> (last visited May 23, 2022).

¹³⁵ *The Networked Digital Library of Theses and Dissertations (NDLTD)*, <https://ndltd.org/> (last visited May 23, 2022).

¹³⁶ *Id.*

¹³⁷ Office of Scholarly Communication University of California, *Open Access Theses & Dissertations*, <https://osc.universityofcalifornia.edu/for-authors/dissertations-theses/> (last visited May 23, 2022).

¹³⁸ *Id.*

¹³⁹ eScholarship University of California, *Terms of Use and Copyright Information* <https://escholarship.org/terms> (last visited May 23, 2022).

University, for example, are open access mostly for the institution and other partners in the higher education sector.¹⁴⁰

The US Library of Congress functions as a national repository with regard to publications in the US, and publishers are usually obligated to deposit new publications at the Library.¹⁴¹ The obligation does not apply to TD, however, because these are not regarded as “publications.”¹⁴² Nevertheless, the Library of Congress holds more than one million TD that were submitted in the US from the end of the 19th century onward, some of which are in microfilm format.¹⁴³ The website of the Library explains that these TD do not have records in the online catalog of the Library of Congress, and none are freely available online through the Library.¹⁴⁴ Therefore, the Library of Congress does not serve as an ETD national repository. To provide a substitute for a national ETD repository, the Library of Congress has transferred the TD deposited at the Library to ProQuest, which operates a commercial TD repository.¹⁴⁵ The Library also subscribes to ProQuest Dissertations & Theses Global, which operates a commercial TD database holding ETD, open only to registered institutions, subject to payment. The Library of Congress allows only researchers on the premises of the Library to gain access to ProQuest TD because of the limitations of the Library’s license.¹⁴⁶ Many US institutions encourage depositing TD with the ProQuest TD system, which holds a large number of US TD (2.7 million TD as of 2021),¹⁴⁷ but they do not make the depositing of TD mandatory. And unless the authors marked their work as open access,¹⁴⁸ ProQuest system does not make their work available to academics from non-registered institutions and to the general public, outside the Library of Congress reading rooms.¹⁴⁹

The UK has been much more determined than the US in promoting a national TD repository. In 2005-2006, the Joint Information Systems Committee (JISC) and the Consortium of Research Libraries in the British Isles (CURL), as equal partners, funded the E-Theses Online Service (EThOS) project. In the first stage, the goal of the EThOS project was to

¹⁴⁰ *Dissertations @ Saint Louis University*, <https://libraries.slu.edu/search/databases/dblink.php?page=dissslu>, (last visited May 23, 2022).

¹⁴¹ General Pugh, et al., *Library of Congress*, in THE GOVERNMENT MANUAL ONLINE VIA GPO ACCESS 55-62 (1990). See also 17 U.S. Code § 407.

¹⁴² *Id.*

¹⁴³ Library of Congress - Ask a Librarian, *Frequently Asked Questions: General* (Aug 03, 2020) <https://ask.loc.gov/faq/300086>.

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ Alissa A. Droog, *ProQuest Dissertations & Theses Global*, ADVISOR REV. THE CHARLESTON ADVISOR 30 (October, 2021) <https://commons.lib.niu.edu/bitstream/handle/10843/24306/2021.10%20PQDT%20Review.pdf?sequence=1>

¹⁴⁸ Non-registered personnel may access publications in case the open access option is chosen, ProQuest - Exlibris, *Users not Affiliated with an Institution*, https://support.proquest.com/s/article/Users-not-affiliated-with-an-institution?language=en_US (last visited May 23, 2022).

¹⁴⁹ Droog, *supra* note 147.

determine the best way for establishing a viable and sustainable national repository for doctoral dissertations, on a fully open access basis. The project was led by the University of Glasgow, serving as the head of the consortium, supported by a line of universities and organizations. The British Library supported the project by developing the business model and the infrastructure. The EThOS service was launched at full capacity in August 2008.¹⁵⁰ As of today, EThOS holds over 300,000 published doctoral dissertations in open access, free for download for the general public, and over 580,000 doctoral dissertations are indexed.¹⁵¹ One hundred forty-eight UK institutions of higher education are participating in the project.¹⁵² Although participation is not mandatory, in 2019 only a handful of the 165 institutions of higher education in the UK¹⁵³ were not participating in the EThOS project. The success of the EThOS project can be attributed to the fact that it was the product of the partnership of the academic libraries, which developed and implemented it based on a bottom-up self-regulation model, without the need for top-down government regulatory intervention. The project can serve as a model for the potential power of academic libraries acting as an engine for reforms promoting open access policies.

A similar initiative to the British EThOS project operating at the European level is the DART-Europe E-Theses Portal (<https://www.dart-europe.org/>). The DART-Europe project was founded in 2005 as a partnership of a consortium of European university libraries to improve global access to European research theses.¹⁵⁴ The DART-Europe is managed by University College London, and it provides fully open access to 1,155,615 theses, from 572 universities in 29 European countries.¹⁵⁵ Participation in this pan-European project is voluntary, and the project does not reflect a unified and binding EU policy.

In sum, current policies relating to the accessibility of TD vary from country to country. Despite awareness of the need to establish national repositories that provide fully open access to TD, there is still no standard or mandatory framework for such repositories, whether national or transnational.

¹⁵⁰ Russell, Awre, Troman & Needham, *supra* note 26; A Troman, N. Jacobs & S. Copeland, *A New Electronic Service for UK Theses: Access Transformed by EThOS*, 33 *INTERLENDING & DOCUMENT SUPPLY*, 157, 159,162 (2007).

¹⁵¹ *About EThOS*, <https://www.bl.uk/ethos-and-theses/about-ethos> (last visited May 23, 2022).

¹⁵² EThOS, *Participating Institutions* https://ethos.bl.uk/HEIList.do?_ga=2.245373188.1870342903.1649573651-389572518.1649573651 (last visited May 23, 2022).

¹⁵³ *Higher Education in Numbers* (Dec. 16, 2021), <https://www.universitiesuk.ac.uk/latest/insights-and-analysis/higher-education-numbers>.

¹⁵⁴ *DART-Europe E-theses Portal*, <https://www.dart-europe.org/basic-search.php> (last visited May 23, 2022).

¹⁵⁵ *Id.*

B. Empirical Glance at Policies Worldwide

We conducted limited, semi-empirical research aimed at collecting information about current approaches in various countries to the accessibility of TD. To this end, we used a questionnaire that we sent to key stakeholders, such as librarians at universities in various countries. We disseminated the questionnaire through platforms such as the American Library Association - Copyright Discussion Group (ACRL), both by mailing list and website blog of the organization, and the Association of Research Libraries, through a member in the organization and through the right to research network, as part of the Info-Justice project at American University Washington College of Law. We also circulated the survey among friends of the network.

This is not an empirical study, and we did not purport to conduct a comprehensive survey of the current policies worldwide regarding the accessibility of TD. The semi-empirical part of the study was intended merely to add some evidence-based perspective to our normative study. We sought mainly to collect information concerning the advantages and pitfalls of the position that TD should be governed by open-access policies.

Participation in the survey involved answering questions about the policies of the respondents' institutions concerning TD. No personal information was collected, except to identify the position of the respondent at the institution (i.e., lecturer, librarian, or other).

Participation in the survey was voluntary. The survey was approved by the ethics committees at the University of Haifa and of the College of Management. The survey was conducted in March-April 2022.

We received 54 replies from various countries, about 50% of them from various States in the US.

As shown in Figure 1, of 54 respondents, 28 were from the US, 7 from Israel, 3 from Canada, 2 from the Netherlands, and one from each of the following countries: Argentina, Spain (reported as Catalonia), Ethiopia, France, Germany, Ghana, Greece, India, Mexico, Nigeria, North Macedonia, Pakistan, Philippines, and the UK.

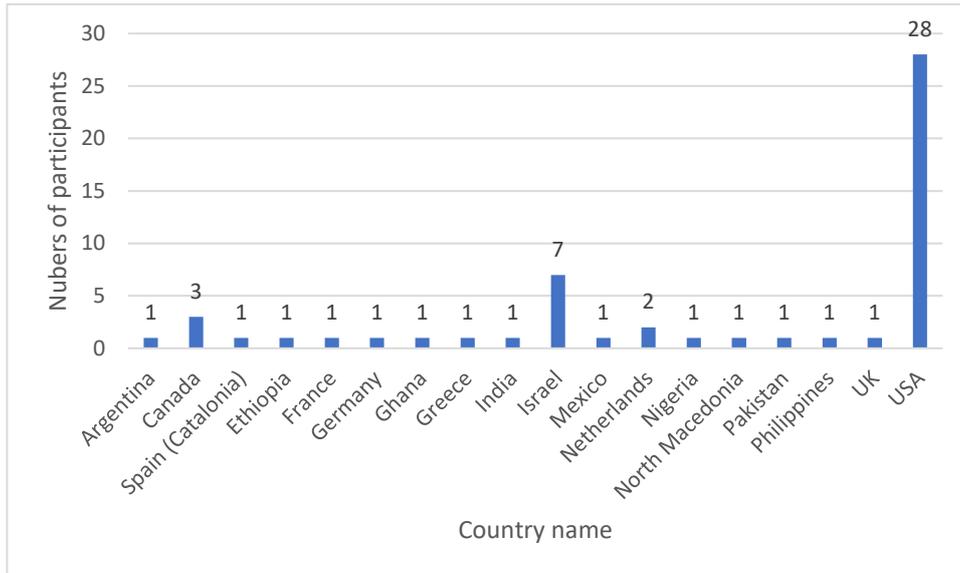


Figure 1: Countries in the survey

Forty-two of 54 respondents were librarians, 7 professors or lecturers, and the remaining 5 included PhD candidates, administrators, and others. We assumed that librarians were well informed about the TD policy at their institution, and therefore focused on analyzing their responses. Forty-two respondents reported that their institution had programs for both secondary and tertiary degrees, 7 reported having only secondary degree programs, and 5 reported having only tertiary degree programs. In the US, of the 28 respondents representing 28 institutions, 24 reported that they offered both secondary and tertiary degree programs.

As shown in Figure 2, the following types of institutions respond to the survey: 37 public institutions, 14 private, 1 semi-public, 1 non-profit organization, and 1 government-supported. Nine of the 14 private institutions were from the US. There were no significant differences between private and public institutions regarding their TD open access policy. As shown in Figure 3, 27 respondents reported that their institution had a separate repository for TD. Four respondents reported that they did not have any repository, none of them from the US.

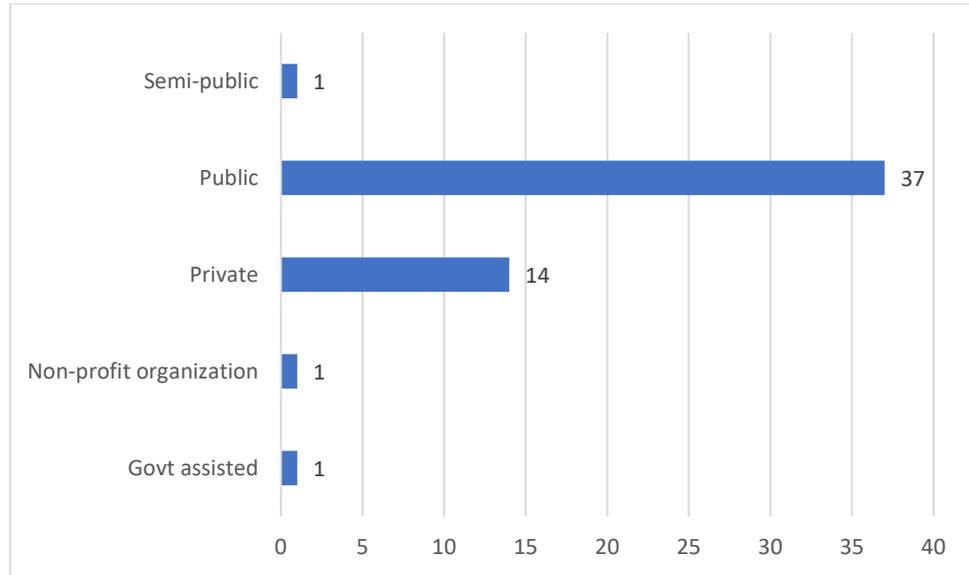


Figure 2: Types of institutions

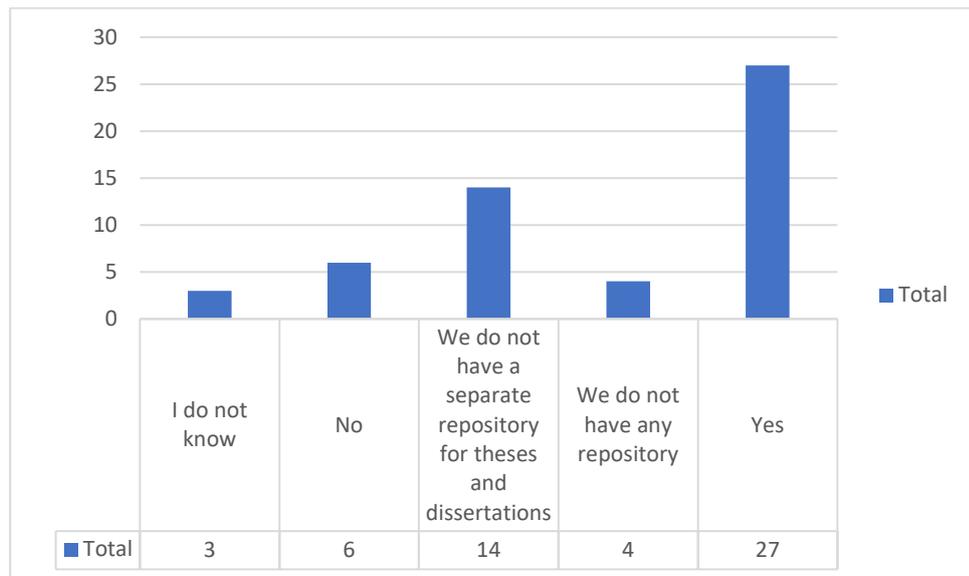


Figure 3: Existence of separate TD repositories at the institutions

To understand whether there is a difference in the open access policy to TD between the various institutions according to the rate of TD deposits per year (high vs. low), we asked respondents to estimate the rate of submissions of TD per year at their institutions. Of the 50 respondents who answered this question, 30 (60%, 19 of them in the US), reported having more than 100 submissions per year. These were both private and public institutions, and most of them reported having an open access policy toward TD.

The transition to the digital era changed how TD can be deposited. Electronic TD (ETD) are common and easy to share. Most of the institutions switched to digital submission and deposit of TD, with or without printed versions. Four institutions required a deposit of a printed TD, only one of them from the US. Two of the 4 institutions reported having an open TD access policy, one reported having fee-based access to TD, and one (in India) did not answer the question about the policy and reported that the institution did not have a repository, therefore TD were not accessible to the general public.

More than 74% of the 50 institutions reported having a single institutional repository. Five of the 50 institutions reported having a shared repository with other institutions, of which 3 were in the US, 1 in Israel, and 1 in the UK.

Seven respondents confirmed that their institutions had a Creative Commons (CC) license policy at their repository, four had a BY-NC-ND¹⁵⁶ license, and the others either provided a choice of four types of licenses to authors, or licenses were determined based on the field of research.

Figure 4 shows that most of the institutions had both theoretical and practical TD. One of the respondents replied that in Mexico, according to general regulations, there are other types of degrees that had a written final work, which were not theses or dissertations. One of the institutions in the US had programs with non-traditional final projects, such as field practicum reports.

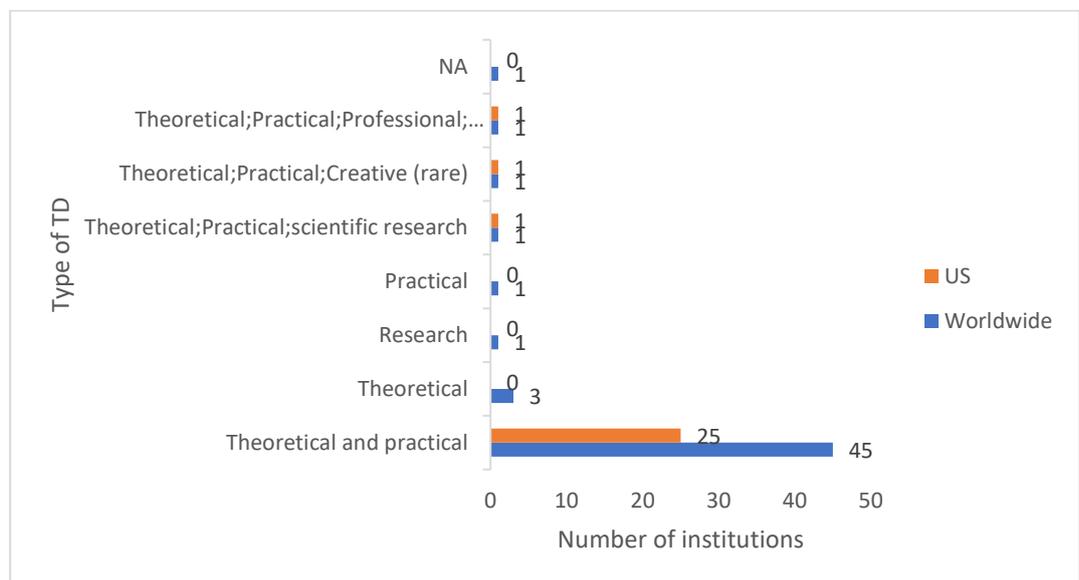


Figure 4: Types of TD by institution

¹⁵⁶ CC license BY-NC-ND (By. Non Commercial. Non Derivatives) is allowing others to download the work and share it with others as long as credit is being given, and as long as the work is kept unchanged and no commercial use is made. See *Creative Commons Attribution – Non Commercial-Non Derivatives 4.0 International (CC BY-NC-ND 4.0)* <https://creativecommons.org/licenses/by-nc-nd/4.0/> (last visited May 23, 2022).

Figure 5 shows that 32 of 54 institutions reported having an open access policy for all TD, some have an option for an embargo. Six respondents did not answer, and 4 respondents reported that the choice of the policy was left to the author. The remaining 12 institutions had an open TD access policy, but a limited one.

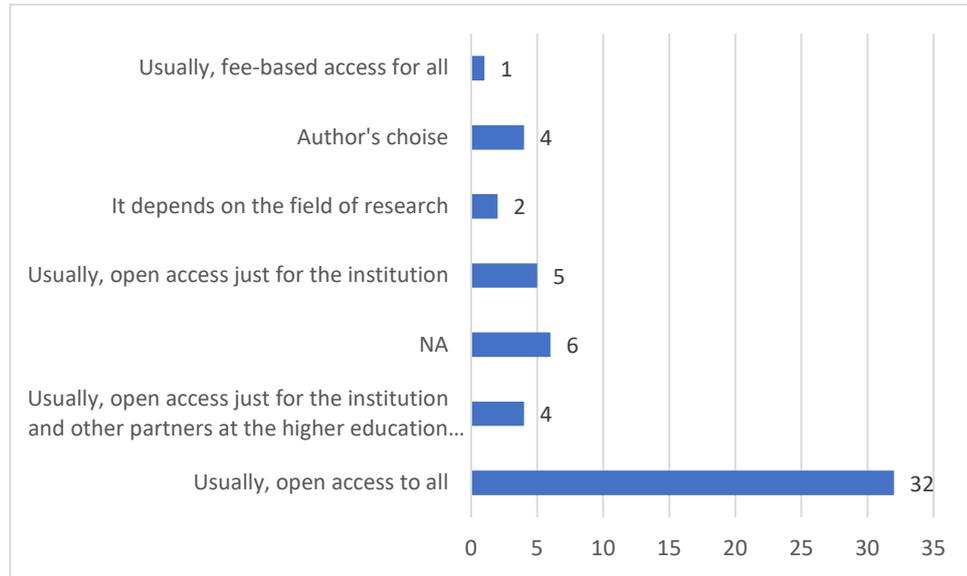


Figure 5: The policy of the TD repository

As shown in Figure 6, 31 institutions (17 in the US) reported not sending a copy of the TD to a national repository, and 19 (9 in the US) reported sending a copy to a national repository. Nine US institutions replied that they deposited the TD at ProQuest Dissertations & Theses Global. Respondents at 5 of these 9 US institutions did not know whether ProQuest was considered to be a national repository, and the remaining 4 respondents reported that they believe that ProQuest Dissertations & Theses Global was considered a national repository.

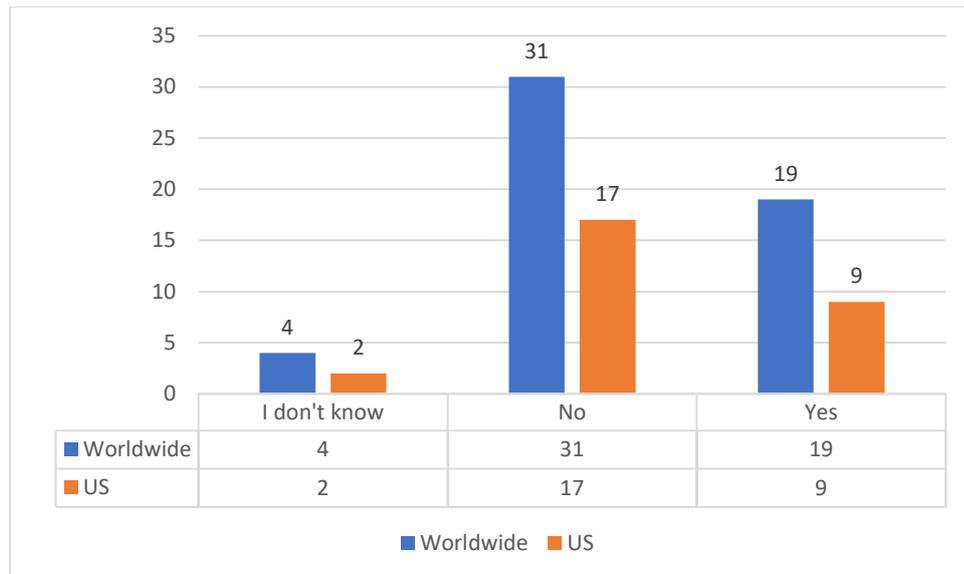


Figure 6: Sending a copy to a national repository

In sum, this semi-empirical survey reinforces the understanding that despite the growing awareness of the importance of an open access policy for TD, no such standard policy exists. Institutions resort to a wide range of policies, in particular with regard to the question of whether the TD repository should be open to all or only to a limited community. In the US, there was some confusion regarding the status of ProQuest and its function as a national repository. Our survey did not find a difference between public and private institutions concerning their open access policy to TD.

IV. RECONCEPTUALIZING THE ACCESSIBILITY OF THESES AND DISSERTATIONS

Considering the historical and normative background of TD as unique fruits of academic research, and in light of the open access movement and its underlying justifications, this article proposes to take TD accessibility one step forward and construct to this end a specially tailored framework that will serve as a unified standard on both national and international levels.

A. A Global and Unified Policy for Open Theses and Dissertations Repositories

Despite growing awareness of the need to allow open access to TD worldwide and seminal initiatives to construct open national TD repositories such as the one in the UK, the data collected in our survey reveal that there is no global and unified policy on this matter. There is no obligation in any country to adopt a policy requiring that the deposited ETD be fully accessible to the general public, rather than to a limited group of academic institutions. Moreover, the involvement of commercial entities in the process of generating TD repositories raises concerns

because these repositories are not aimed at serving the general public and are not free. In the US, various institutions have adopted different approaches to open access.

We propose to reconceptualize TD and differentiate them from all other academic research, paving the way for establishing a specially tailored policy for a global and full-fledged open access policy to TD, under a harmonized scheme. Under this scheme, each institution should generate a separate repository for TD or deposit its EDT in a public national repository for TD, which allows their easy identification. Each institution should make TD fully accessible for free, subject to the possibility of applying for an embargo (*i.e.*, delay of publication) for a limited time for justified reasons.¹⁵⁷ This general policy may be adopted at either the institutional level or at a higher one, such as the relevant regulatory authority in each country, or as a global norm. To create a global and unified standard, such a policy should be made mandatory. The end goal is to establish a global network of national or institutional TD repositories that would function as an “open worldwide web of TD.” All the arguments in favor of opening access to TD become stronger when they are considered on a global scale. Therefore, the repositories should be operated according to a shared standard, allowing their interconnectivity in the long term.¹⁵⁸ Accomplishing this goal requires ongoing collaboration between countries and institutions, which would guarantee that all repositories comply with shared technical standards.¹⁵⁹ For best results, such a policy should be implemented by a coordinating international entity.

Several international organizations may initiate and manage such a project. One candidate is UNESCO, which advocates “access to information as a fundamental freedom and a key pillar in building inclusive knowledge societies.”¹⁶⁰ In November 2021, UNESCO adopted the Recommendation on Open Science,¹⁶¹ which stresses the importance of international collaboration in the “efforts towards universal access to the outputs of science,”¹⁶² although no specific clause addresses TD.

Another candidate is WIPO. Recently, scholars in the field of intellectual property have suggested that WIPO promote measures to balance copyright and user rights to the products of research, which are important for the development of artificial intelligence systems.¹⁶³

¹⁵⁷ For further discussion on justified reasons for approving a limited embargo period, see *infra* Part VII A, C.

¹⁵⁸ For further discussion on the technical barriers associated with archives, including repositories, and on the need to set some shared standards for interconnectivity between repositories, see *infra* Part VII D.

¹⁵⁹ Joseph A Williams & Elizabeth M. Berilla, *Minutes, Migration, and Migraines: Establishing a Digital Archives at a Small Institution*, 78(1) THE AM. ARCHIVIST 84, 86-88 (2015).

¹⁶⁰ UNESCO, *Right to Information*, <https://www.unesco.org/en/communication-information/right-information?hub=370> (last visited May 23, 2022).

¹⁶¹ See UNESCO, *Open Science*, *supra* note 97.

¹⁶² Recommendation on Open Science, *supra* note 100, at Article (vii)22b.

¹⁶³ Flynn, Geiger & Quintais, *supra* note 21.

Copyright is one of main barriers to access to TD, as discussed below.¹⁶⁴ WIPO, which is the international organization dealing with copyright norms, may help design norms for accessing TD, which is an aspect of the right to research and open science.

B. Reasons Supporting Special Treatment of Theses and Dissertations

The reconceptualization of TD is based on their special nature and purpose as academic research that confirms the researcher's entitlement to an academic degree, as well as on justifications of the open access to academic research. These special characteristics of TD account for their unique status, which in turn justifies the adoption of special treatment. The various reasons supporting a special treatment of TD are discussed below.

It should be noted that there are differences between master's theses and doctoral dissertations. The difference does not lie in the basic shared idea of a final work which is the culmination of advanced degree studies, but in the level and quality of the research conducted by the students.¹⁶⁵ At some institutions, doctorate students are considered employees of the institutions, and therefore their status is different from that of master's students.¹⁶⁶ Therefore, while the following claims and arguments apply to both master's theses and doctoral dissertations, a global and uniform standard should be designated for doctoral dissertations only, at least as a first move.

1. Theses and Dissertations as a Special Academic Product

TD are unique products of academic research, not research conducted by researchers in the regular course of their careers. Rather, it is research conducted under the supervision of the academic institution. In many modern societies, academic institutions are permitted to grant academic degrees subject to state regulation.¹⁶⁷ An academic degree denotes that the student has met the requirements of the given degree, including a thesis or dissertation for some of the degrees. TD are the products of a particular type of research intended to secure an academic certificate attesting to a personal achievement of the student. The certificate grants several benefits, the most important of which is the potential qualification for serving as an instructor at the university, which was the initial reason for

¹⁶⁴ See *infra* Part V. C.

¹⁶⁵ Sid Bourke & Allyson P. Holbrook, *Examining PhD and Research Masters Theses*, 38(4) ASSESSMENT & EVALUATION IN HIGHER EDUCATION 407-16 (2013).

¹⁶⁶ A respondent of the survey stressed that in the Netherlands secondary degree final written work should not be regarded as scholarly material as opposed to doctoral dissertation. Whereas doctoral degree students are usually considered university staff members, Master's degree students are not treated as such, and are not expected to meet the standards of academic scholars.

¹⁶⁷ DuS, *supra* note 51; Bao, Kehm & Ma, *supra* note 10, at 526; USNEI, *Structure of U.S. Education*, <https://www2.ed.gov/about/offices/list/ous/international/usnei/us/edlite-structure-us.html> (last visited May 23, 2022).

academic degrees.¹⁶⁸ Over the years, as was discussed earlier, the academic degree has come to serve other purposes as well, especially in the labor market.¹⁶⁹

The special status of TD has potential implications for the policy governing their accessibility. We propose a new perception, according to which TD reflect a social contract, in which a person receives a certificate that serves as a means to leverage personal social and economic benefits,¹⁷⁰ and in exchange, the academic research should be fully disclosed to society to promote the public good. A similar kind of social contract is underlying the granting of a patent: the patentee receives exclusivity for a limited time, which serves as means for economic gain, and in exchange the patented invention must be fully disclosed to society, to serve the public interest by encouraging the incremental growth of knowledge for the public good.¹⁷¹

An academic degree, in this sense, can be perceived as social entitlement, similar to a patent right, which should be granted under full disclosure terms. At the same time, some exceptions should be acknowledged, justifying a limited period of embargo, for example, in cases where there is an intention to file a patent application based on the research, which therefore necessitates non-disclosure of the relevant knowledge.¹⁷² Such an exception, which is further discussed in following Part V, is consistent with the public interest because it serves the end goal of full disclosure of knowledge, yet with a limited period of suspension. After the patent application has been filed, the research can be released for open access because the patent would also be subject to full disclosure. Such an exception is also consistent with another public interest of encouraging technology transfer from academia to the industry by filing patents on knowledge developed in the course of academic research.¹⁷³ The default rule, however, should be full and immediate accessibility of TD.

Another unique attribute of TD which merits their special treatment has to do with the evaluation process. The call to acknowledge a right to research as a fundamental right is based on the understanding that research provides individuals and humanity with new knowledge.¹⁷⁴ This rationale reinforces the call to provide access to TD. As described in Part I, TD are

¹⁶⁸ BEVIS, *supra* note 6, at 39.

¹⁶⁹ Bao, Kehm & Ma, *supra* note 10, at 526.

¹⁷⁰ In this context, Reich's seminal article proposing to perceive State licenses as a form of "new property" should be noted, *see* Charles A. Reich, *The New Property*, 73 YALE L.J. 733, (1964).

¹⁷¹ Katherine J. Strandburg, *User Innovator Community Norm: At the Boundary between Academic and Industry Research*, 77 FORDHAM L. REV. 2237 (2009).

¹⁷² *See e.g.*, 35 U.S.C. § 101. *See also* Howard K. Schachman, *From "Publish or Perish" to "Patent and Prosper"*, 281(11) J. OF BIOLOGICAL CHEMISTRY 6889 (2006).

¹⁷³ Jason Owen-Smith & Walter W. Powell, *To Patent or Not: Faculty Decisions and Institutional Success at Technology Transfer*, 26(1) THE J. OF TECH. TRANSFER 99 (2001).

¹⁷⁴ Arjun Appadurai, *The Right to Research*, 4(2) GLOBALISATION, SOCIETIES AND EDUC. 167, 167-168 (2006).

subject to strict academic supervision and assessment.¹⁷⁵ They are supervised by a senior researcher and are evaluated by other academic scholars in the relevant field. In other words, TD are subject to at least a double peer-review process and are usually evaluated according to strict requirements that attest to their high academic quality. By contrast, not all academic publications, including open access publications, necessarily undergo peer review or strict evaluation.¹⁷⁶ Therefore, if TD are not preserved in a separate repository, they might become mixed with other types of research publications and disappear in the "sea of information." Thus, to avoid the problem of flooding of information, and to overcome the concern that not all publications are trustworthy and are of the same academic credibility,¹⁷⁷ a specially designated repository for TD should be established.

2. Public Expenditure Policy

Another reason justifying the unique status of TD as academic research that should be subject to a special open access policy is based on public expenditure. Masters and doctoral students are instructed at their universities, which requires the investment of various resources. The resources invested in graduate students' studies and their final research projects include the instructors' time and attention, direct funds in form of scholarships, and indirect funds in facilities and other material and non-material resources needed to support the research.¹⁷⁸ The expenditure on graduate students far exceeds the immediate investment in their academic research in general.¹⁷⁹ The training of new cohorts of scientists requires additional and special efforts, taking into consideration that these scholars are not experienced yet and that this is a long and demanding process for

¹⁷⁵ See *supra* Parts I.A. and I. B, and in particular notes 52, 56, 67, 78-79.

¹⁷⁶ See, e.g., websites such as *ArXiv*, *arxiv.org* (last visited May 24, 2022) in which it is stated: "e-prints posted on arXiv are not peer-reviewed by arXiv; they should not be relied upon without context to guide clinical practice or health-related behavior and should not be reported in news media as established information without consulting multiple experts in the field".

¹⁷⁷ WILLINSKY, *supra* note 118, at 8-9; Yehuda Baruch, Abby Ghobadian & Mustafa Özbilgin, Editorial, *Open Access – The Wrong Response to a Complex Question: The Case of the Finch Report*, 24 BRIT. J.MGMT. 147 (2013). In recent years, there has been a growing demand to support fact-based research, see, e.g., Kathleen Calderwood, *March for Science Participants Hoping to Send Strong Message to Political Leaders*, ABC NEWS (Apr. 23, 2017), <http://www.abc.net.au/news/2017-04-22/march-for-science-australians-join-worldwide-movement/8463800>; Oliver Milman, *March for Science Puts Earth Day Focus on Global Opposition to Trump*, THE GUARDIAN (Apr. 22, 2017), <https://www.theguardian.com/technology/2013/mar/01/aaron-swartz-partner-us-delaying-investigation>.

¹⁷⁸ See, e.g., data regarding US academy at the National Center of Education Statistics: <https://nces.ed.gov/fastfacts/display.asp?id=75>; <https://nces.ed.gov/programs/coe/indicator/cue> (concluding that: "Instruction, including faculty salaries and benefits, was the largest single expense category at public 2-year (40 percent), public 4-year (27 percent), and private nonprofit 4-year (30 percent) degree-granting postsecondary institutions in 2018–19").

¹⁷⁹ See e.g., data regarding US academy: <https://nces.ed.gov/programs/coe/indicator/cue> (referring to the rising instruction expenses per full-time equivalent student at degree-granting postsecondary institutions in the US).

both the student and the institution.¹⁸⁰ This argument is closely related to that of the general open access movement that publicly funded research belongs to the public. The public should not pay twice for the same research, once for conducting the research and then for gaining access to its results.

Given that most academic institutions that are training students for advanced degrees are public or supported by public funds,¹⁸¹ the policy regarding the publication of TD should serve the public interest. As noted, according to the open science movement and the associated open access approach to publication, open access to research promotes the public good based on the various considerations discussed above.¹⁸² The logical conclusion is that TD should be subject to the general recommendation to impose an open access policy on academic works, a justification reinforced by the extensive public investment in advanced degree students. The effort in training advanced degree students, some of which is a “sunk cost” in economic terms,¹⁸³ suggests that the final outcome of this academic effort should be subject to stringent accounting that guarantees the return of investment to the public. The public expenditure argument is therefore particularly convincing in support of a mandatory scheme of open access policy toward TD.

The open access publishing of TD may also result in more efficient use of research funds and better development of science: it may reduce overlapping studies; enhance the exposure of researchers to other scientific fields; generate collaborations through wide exposure of the studies; help confirm research results more easily; shorten the time of bringing the research to the attention of the scientific community; and provide a convenient and systemic option for conducting follow-up research based on prior research.¹⁸⁴

The design of the repositories plays a crucial part in the implementation of open access policies. As noted, uploading TD to an institutional repository does not necessarily mean that these works are widely accessible.¹⁸⁵ Repositories may be open only to particular groups, such as the community of the host institution.¹⁸⁶ Yet, the public investment in academic institutions often includes also support for building and maintaining the academic repositories, as in the UK, Spain, and Israel.¹⁸⁷

¹⁸⁰ Peter Schneider, Nicole Thaller & Dieter Sadowski, *Success and Failure of PhD Programmes: An Empirical Study of the Interplay between Interests, Resources and Organisation*, GOVERNANCE AND PERFORMANCE IN THE GERMAN PUBLIC RESEARCH SECTOR. 107 (2010).

¹⁸¹ ADRIAN ZIDERMAN & DOUGLAS ALBRECHT, FINANCING UNIVERSITIES IN DEVELOPING COUNTRIES 1-20 (2013); Bikas C. Sanyal & D. Bruce Johnstone, *International Trends in the Public and Private Financing of Higher Education*, 41(1) PROSPECTS 157 (2011).

¹⁸² David, *supra* note 84, at 19; David & Uhler, *supra* note 13.

¹⁸³ Yahya Alshehhi, *Is Training A Sunken Cost?*, in ANNALS OF THE UNIVERSITY OF ORADEA, ECONOMIC SCIENCE (2016).

¹⁸⁴ Kitchin, Collins & Frost, *supra* note 113.

¹⁸⁵ Joachim Schöpfel & Hélène Prost, *Degrees of Secrecy in an Open Environment: The Case of Electronic Theses and Dissertations*, 6 J.L FOR COMM’N 66 (2013).

¹⁸⁶ See, e.g., the repository of Saint Louis University, *supra* note 140.

¹⁸⁷ Rigby & Jones, *supra* note 132, at 1390.

The underlying rationale is that the role of the academic sector is also to facilitate the dissemination of knowledge, its storage, and preservation.¹⁸⁸ Thus, a mandatory policy allowing full access to the public to academic repositories can best serve the end goal of access to knowledge for the public good. The justification for limiting access to academic repositories to certain communities is questionable. Although in a highly competitive academic environment, such limitations may provide a short-term advantage to the scholars of the institutions, it is nevertheless inefficient and inappropriate from a broader national perspective. The guiding principle of the open science movement is that the more open science is, the better the research outcomes being generated are.¹⁸⁹ Therefore, the warranted policy is fully open access. Given that the activities of the public institutions, as well as their repositories, are supported by public funds may also necessitate giving all scholars equal opportunities in access to the sea of knowledge, in contrast to granting a manipulative advantage to the scholars of the more established universities.¹⁹⁰

Another potential concern regarding the transition to digital repositories is the lack of sufficient budgetary resources and the economic burden on the institutions, mainly due to the cost of creating and maintaining the repositories.¹⁹¹ The budgetary concerns and the potential gaps between the various academic institutions support the establishment of national TD repositories, serving the entire academic sector in a given country. Such repositories may be part of existing national libraries. Yet, our survey found that digital repositories already exist in most institutions of higher education,¹⁹² and the marginal cost of adding a section designated to TD is not substantial. The additional costs associated with the maintenance of a TD repository, including operational costs of information security¹⁹³ and privacy, do not appear significant.

Finally, it is important to designate a special part of the repository to TD, or at least designate TD by special indexing, to allow their easy identification for promoting transparency of the academic standards required for qualifying for advanced academic degrees. Greater transparency in the competitive academic environment is imperative not only for promoting an efficient "academic market" but also for promoting

¹⁸⁸ See *supra* notes 85- 86.

¹⁸⁹ *Id.*

¹⁹⁰ For the emergence of the "higher education market" and for the impact of competitiveness on higher education, see: Ngai-Ling Sum & Bob Jessop, *Competitiveness, the Knowledge-Based Economy and Higher Education*, J. OF THE KNOWLEDGE ECON (2012), 10.1007/s13132-012-0121-8.

¹⁹¹ Kitchin, Collins & Frost, *supra* note 113, at 668-69.

¹⁹² See *supra* Part III B.

¹⁹³ Regarding the fear that knowledge included in scientific publications will be misused, for example, in the biological field, and therefore should be kept confidential for security reasons, see John A. Robertson, *Bioterrorism and the Right to Research*, 4(4) NATURE REV. GENETICS 248, 248 (2003). We propose to allow limited exceptions to the rule of open access to TD, which may be also based on security reasons.

values of fairness and equality when it comes to the use of public funds for training advanced degree students.¹⁹⁴

3. Academic Innovation Policy

A policy aimed at fostering academic innovation is at the heart of another prominent justification for adopting an open access policy in particular toward TD as unique academic research. The open science movement is based on the understanding that knowledge develops in an incremental process.¹⁹⁵ As noted, the historic roots of the requirement to submit the final product of advanced degree studies in print have created a culture of exchange of knowledge and enabled the sharing of new and innovative information with the global research community.¹⁹⁶ All studies on the economics of innovation stress openness as a building block of a thriving innovative environment.¹⁹⁷ Open access to the outputs of academic research fosters an efficient innovation environment.¹⁹⁸ Likewise, the policy underlying patent law is that the public interest justifies the granting of exclusive rights to provide incentives to invest in research and development, but only for a limited time, after which the invention becomes part of the public domain, to allow further research and development.¹⁹⁹ These principles of knowledge sharing are prevalent in modern societies.

The principles underlying the necessity of openness of knowledge are particularly robust concerning academic research of any kind. The academic sector serves as the engine of progress in science, and its most important role is to develop human knowledge.²⁰⁰ Making academic knowledge, and thereby academic innovation, open is also an endeavor pursued worldwide. This basic justification for open academic science is even stronger when it comes to TD, which are the products of a unique type of academic research, in which innovative merit is a strict prerequisite.²⁰¹ Moreover, in all other academic research, the mechanism that inspects the value of a contribution to science is based on peer reviews

¹⁹⁴ For the importance of transparency in higher education "market," including in the accreditation system, institution rankings and performance contracts with the state, see Jongbloed, Vossensteyn, Vught & Westerheijden, *supra* note 34, at 441.

¹⁹⁵ See *supra* note 87.

¹⁹⁶ See *supra* Part I A.

¹⁹⁷ See *supra* notes 118-119.

¹⁹⁸ Madhavi Sunder, *Cultural Environmentalism @ 10: The Invention of Traditional Knowledge*, 70 LAW & CONTEMP. PROBS. 97 (2007).

¹⁹⁹ See e.g., Art I.S8.C8.1.1 U.S.C. ("To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries"); 35 U.S.C. § 154.

²⁰⁰ Vijay Kumar Soni & Sadananda Sahoo, *Law, Technology and Freedom of Knowledge Production: Contextualizing Higher Education in a Globalised World*, 11 GNLU J.L. DEV. & POL. 60, 68 (2021).

²⁰¹ It was stressed that in the very early days of academia in England the only aim of the thesis was to certify that a student may function as a university teacher, and his manuscript was not perceived as a contribution to existing knowledge. Yet, as the function of theses has evolved over the years, their goals became similar if not identical to any other research in terms of contribution to knowledge, see Rigby & Jones, *supra* note 132, at 1409.

conducted by the journal that accepts the research for publication;²⁰² in the case of TD, this inspection is institutional. Only TD receive a university approval that they have met the threshold of innovation. Scientific journals are acting in a competitive environment, therefore to maintain their prestige and credibility they may conduct a rigorous peer review mechanism to make sure that the research published meets the innovation threshold.²⁰³ But journals are not subject to any official public oversight, in contrast to universities, at least with regard to their authority to grant academic degrees.²⁰⁴ It is possible to argue that the approval of TD is not different from the peer review mechanism of the journals, particularly given the academic freedom that grants universities the autonomy to examine TD as they deem fit. But universities, whether private or public, are subject to state regulation when it comes to their authority to grant academic degrees.²⁰⁵ Therefore, the approval of TD is usually subject to rigorous institutional inspection.²⁰⁶ As noted, already in the early days of the universities, the acquiring a master's or a doctoral degree involved great effort, and the degree was regarded as one of the students' most important scientific achievements.²⁰⁷ Although the doctoral dissertation model is controversial today, there are still strong advocates for this method as the most appropriate way of disseminating academic knowledge.²⁰⁸ The essence of TD as the flagship of academic scientific innovation supports a policy of open access to them and of differentiating them in designated repositories to promote an efficient innovation environment.

Our argument takes doctoral dissertations back to their origins. Today, master's and doctoral programs are intended to prepare the future generation of teachers in academia, and just as important, to prepare the future generation of leaders of industry. The pursuit of innovation is

²⁰² Though there are many flaws in the "peer review" method, it is still the customary one in most scientific journals, *see e.g.*, Richard Smith, *Peer Review: A Flawed Process At The Heart Of Science And Journals*, 99 J. OF THE ROYAL SOC'Y OF MED. 178 (2006); Neha Vora & Tom Boellstorff, *Anatomy of an Article: The Peer-Review Process as Method*, 114 (4) AM. ANTHROPOLOGIST, 578 (2012).

²⁰³ Martin Fenner, *Altmetrics and Other Novel Measures for Scientific Impact*, in OPENING SCIENCE: THE EVOLVING GUIDE, *supra* note 85, at 179.

²⁰⁴ *See e.g.*, John Bohannon, *Who's Afraid of Peer Review*, 342 SCIENCE 60 (2013) (discussing open access journals that accept articles for publication without any process of peer review).

²⁰⁵ The Bologna Process introduced in the EU was aimed to "increasing standardisation of curriculum for the purposes of comparability, and devising common methods for reporting on skills, and competencies acquired through academic studies", *see* Mary Catharine Lennon, *Learning Outcomes Policies for Transparency: Impacts and Promising Practices in European Higher Education Regulation*, in EUROPEAN HIGHER EDUCATION AREA: THE IMPACT OF PAST AND FUTURE POLICIES 527, 528 (Adrian Curaj, Ligia Deca & Remus Pricopie eds., 2018).

²⁰⁶ Anita Lazurko, Tim Alamenciak, Lowine Stella Hill, Ella-Kari Muhl, Augustine Kwame Osei, Dorian Pomezanski, Kyle Schang, & Dilruba Fatima Sharmin, *What Will a PhD Look Like in the Future? Perspectives on Emerging Trends in Sustainability Doctoral Programs in a Time of Disruption* 12(4) WORLD FUTURES REV. 369, 372 (2020).

²⁰⁷ *See supra* Part I. A.

²⁰⁸ *See* Rigby & Jones, *supra* note 132, at 1409.

embedded in academic research, and is particularly enshrined in the final written work reflecting the culmination of advanced degree studies. In the past, the "disputation" stage that was part of the training process of doctoral studies was held in public and was open to the academic world.²⁰⁹ Today, the opening of TD may reflect a return to the roots of advanced degree studies: the search for innovation and collaboration with colleagues for the advancement of science. A global policy of open access toward TD can help accomplish this goal.

V. POTENTIAL BARRIERS TO OPEN ACCESS POLICY OF THESES AND DISSERTATIONS

The proposed mandatory policy of open access to TD may face some barriers and challenges. The interests of the various stakeholders, including the advanced degree students, the universities, and the publishers of the research may conflict with the need to publish TD in open access format that allows maximal dissemination. These conflicting interests may serve as a basis for exceptions to the general policy of open access, which would safeguard the stakeholders' interests. Such exceptions may help reduce resistance to the adoption of the general mandatory policy and facilitate its broad implementation.

A. *Patents, Trade Secrets, and Commercialization of Academic Knowledge*

One of the main obstacles to the open access policy to TD is the interest of students and the academic institutions in commercializing academic knowledge and transforming it into applied innovation that may generate profits.²¹⁰ One of the main vehicles for commercializing academic knowledge is the registration of patents for innovative knowledge and their licensing for commercial use.²¹¹ The academic institution may be registered as the owner of the patent, and the student may be identified as the inventor whose share in the profits is determined by the policies and bylaws of the institution.²¹² Patents are the means of academic institutions for realizing the commercial potential of academic knowledge.

²⁰⁹ See Weijers, *supra* note 44, at 24-26.

²¹⁰ DAVID C. MOWERY ET AL., *IVORY TOWER AND INDUSTRIAL INNOVATION: UNIVERSITY-INDUSTRY TECHNOLOGY TRANSFER BEFORE AND AFTER THE BAYH-DOLE ACT IN THE UNITED STATES* (2004).

²¹¹ Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VIRG. L. REV. 1663, 1693-95 (1996); HENRY ETZKOWITZ, *THE TRIPLE HELIX: UNIVERSITY-INDUSTRY-GOVERNMENT INNOVATION IN ACTION* (2008); Arvids A. Ziedonis, *Empirical Analyses Related to University Patenting*, in *RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW* (B. Depoorter, P. Menell, & D. Schwartz eds. 2019).

²¹² Hagit Messer-Yaron, *Capitalism and the Ivory Tower: The Gordian Knot Between Money and Science*, 57 ISR. J. ECOLOGY & EVOLUTION 331 (2010).

Over the decades, academic institutions have been increasingly commercializing academic knowledge.²¹³ The process of transfer of knowledge or "technology transfer" has intensified since the 1980s with the emergence of the knowledge-based economy.²¹⁴ Technology transfer worldwide has been discussed extensively by policymakers and in the literature.²¹⁵ A key question concerns the justification for such activity and the purpose of academic research. Although it is accepted that academic research should be driven by curiosity, and that its end goal should be the development of basic science and human knowledge, in the knowledge-based economy the academic sector plays an important role in contributing to the economic growth for the public good.²¹⁶ Thus, developing and disseminating academic knowledge should be settled within the innovation ecosystem of the private sector, which is based on patenting and licensing. Academic scholars strive to disseminate their research by way of publications, an interest that they must reconcile with an additional one of commercializing their academic knowledge.²¹⁷ The two opposing interests generate a conflict regarding the openness of academic research: the interest of dissemination of knowledge entails policies supporting open access to research; by contrast, the interest of commercialization of knowledge requires keeping the products of research confidential to reap its potential economic benefits. A requirement for the granting of a patent is that the applied knowledge, *i.e.*, the patented invention, be new.²¹⁸ The novelty requirement means that a patent is not granted for something that is already "patented, described in a printed publication, or in public use, on sale, or otherwise available to the public."²¹⁹ In practice, novelty is examined with reference to the "prior art," meaning that to be eligible for a patent, an invention cannot be disclosed in any previously published knowledge.²²⁰ Novelty is the most basic principle of patent law, and it requires preserving the secrecy of the invention until the filling of the patent application. Therefore, the two interests of dissemination of academic research and its commercialization are conflicting. This conflict is also reflected in the underlying motivation regarding the outcomes of

²¹³ ETZKOWITZ, *supra* note 211. For the commercialization of knowledge in general, see THE COMMODIFICATION OF INFORMATION: POLITICAL, SOCIAL AND CULTURAL RAMIFICATIONS (Niva Elkin-Koren & Neil W. Netanel eds., 2002).

²¹⁴ H. Etzkowitz & L. Leydesdorff, *Emergence of A Triple Helix of University Industry Government Relations*, 23 SCI.AND PUB. POLICY 279 (1996).

²¹⁵ See, e.g., Peter Lee, *Patents and the University*, 63 DUKE L.J. 1 (2013); Christopher J. Ryan Jr. & Brian L. Frye, *An Empirical Study of University Patent Activity*, 7 N.Y.U. J. INTE'L. PROP. & ENT. L. 51 (2017); Patricia E. Campbell, *University Inventions Reconsidered: Debunking the Myth of University Ownership*, 11 WM. & MARY BUS. L. REV. 77 (2019).

²¹⁶ ETZKOWITZ, *supra* note 211; L. Leydesdorff, *The Triple Helix Model and The Study of Knowledge-Based Innovation Systems*, 42 INT'L J. OF CONTEMPORARY SOCIOLOGY 1 (2005).

²¹⁷ REBECCA S. EISENBERG, BARGAINING OVER THE TRANSFER OF PROPRIETARY RESEARCH *Tools*, in 223 EXPANDING THE BOUNDARIES OF INTELLECTUAL PROPERTY (C. Dreyfuss, D. L. Zimmerman & H. First eds., 2001).

²¹⁸ See e.g., 35 U.S.C. § 102 (requirement of novelty).

²¹⁹ 35 U.S.C. § 102.

²²⁰ Timothy R. Holbrook, *Patent Prior Art and Possession*, 60 WM. & MARY L. REV. 123, 127 (2018).

research. As members of the academic sector, scholars have the ambition to publish their research to gain academic prestige and advance their careers.²²¹ By contrast, as members of an industrial sector, their ambition is to reap the economic benefit of their research, which is achieved by commercialization of the knowledge through intellectual property rights; in the cases of patents and trade secrets, this requires confidentiality.²²² The commercialization of knowledge and the prevention of immediate publication of new studies has additional negative consequences for academic research, such as delay in the development of incremental knowledge that based on prior knowledge,²²³ and a chilling effect on scientific cooperation, which hampers innovation by suppressing the publications of cutting-edge research.²²⁴

TD are part of academic knowledge that can be commercialized. Particularly in the life sciences and exact sciences, the research conducted by advanced degree students is part of wider research projects led by the supervising professor.²²⁵ Thus, the products of TD are subject to the same conflict between the competing interests of openness of research and its commercialization. But once a patent application has been filed, the invention may be disclosed, and confidentiality is no longer required. Moreover, there is a clear incentive to file a patent application as soon as possible given the “first-to-file takes all” principle that governs patents.²²⁶ Therefore, the competing interests may be balanced by an embargo period, which exempts the TD from the general open access for a limited period of time, enabling the student and the institution to file a patent application.²²⁷ Typically, the embargo may last up to two or three years.²²⁸ The embargo may be used to reconcile other conflicts of interest as well,

²²¹ For a critical analysis of the academic “publish or perish” ethos, see Mark De Rond & Alan N. Miller, *Publish or Perish Bane or Boon of Academic Life?* 14 J. OF MGMT INQUIRY, 321 (2005).

²²² For the requirement of secrecy in the patent system, see *supra* notes 219-220. For trade secrets as a form of intellectual property right, see Mark A. Lemley, *The Surprising Virtues of Treating Trade Secrets as IP Rights*, 61 STAN. L. REV. 311, 315 (2008).

²²³ Murray & Stern, *supra* note 105.

²²⁴ Thomas Schildhauer & Hilger Voss, *Open Innovation and Crowdsourcing in the Sciences*, in *OPENING SCIENCE: THE EVOLVING GUIDE*, *supra* note 85, at 255, 256.

²²⁵ See, e.g., Franz Barjak, *Simon Robinson International Collaboration, Mobility and Team Diversity in the Life Sciences: Impact on Research Performance*, 3 SOC. GEOGRAPHY DISCUSSIONS 121 (2007).

²²⁶ For the move of the US patent system from “the first to invent” principle to “the first to file” principle, which is the accepted rule worldwide, see Leahy-Smith America Invents Act 2011; Shuba Haaldodderi Krishnamurthy, *U.S. Patent Reform Act of 2011 (America Invents Act): The Transition from First-to-Invent to First-to-File Principle*, 5 J. INTE’L. PROP. INFO. TECH. & ELEC. COM. L. 39 (2014). See also Gideon Parchomovsky, *Publish or Perish*, 98 MICH. L. REV. 926 (2000).

²²⁷ Jorge L. Contreras, *Data Sharing, Latency Variables, and Science Commons*, 25 BERKELEY TECH. L.J. 1601, 1640-41 (2010).

²²⁸ The Israeli Forum for Access to Knowledge in Israeli Higher Education Institutions, established in 2009 and directed by the authors of this article, is currently promoting a policy of open access to TD. As part of the project, we created a form that should be completed by advanced degree students to request up to three years of embargo for various reasons, including the filing of a patent application. Such requests should be approved by an institutional committee.

such as aspects of state security and privacy.²²⁹ But when the academic knowledge does not qualify for a patent, the desire to keep it as a trade secret for commercial purposes is not legitimate because the secrecy is not limited in time. The underlying principle of the embargo is to allow commercial interests to override the accessibility interest for a short period of time.

B. Publication on Ranked Platforms

Advanced degree students often seek to publish their TD as articles in scientific journals or as a book. These publications are important for those who wish to develop an academic career. Academics' profile is based first and foremost on their list of publications.²³⁰ Scientific journals and publishers are ranked by various methods.²³¹ Publishing one's research on a highly ranked platform is important for one's professional reputation and academic promotion. Therefore, a policy requiring mandatory open access publication of TD may prevent its concurrent publication in a scientific journal or as a book and conflict with the students' interests to publish their research on highly ranked platforms. Thus, the open access policy promotes societal interests but undermines the ability of individual students to fully reap the fruits of their academic studies.

This barrier to a policy of open access to TD may be partially eliminated in several ways. First, the assumption that publishing TD in an open institutional repository undermines the ability to concurrently publish the research in scientific journals and books needs to be examined empirically. The question is whether the mere disseminating of research to the public in institutional repositories undermines its potential publication in a journal or a book. This situation should be distinguished from the different situation in which there is a prior publication of a certain research in another journal or a book. Publishers seek exclusivity, therefore accept research for publication only if it was not published before in a journal or a book, but prior access to the research in an institutional repository or even in other academic repositories may not conflict with their interests. A survey conducted by Ramirez et al. in 2011 supports the conclusion that the concern regarding the barrier to publication is largely misplaced: according to the data collected in the US, 82.8% of journal editors and 53.7% of university publishers would not automatically refuse to publish TD manuscripts because of their prior circulation in open access

²²⁹ For the obstacles in releasing scientific data, see Victoria Stodden, *Intellectual Property and Computational Science*, in *OPENING SCIENCE: THE EVOLVING GUIDE*, *supra* note 85, at 225, 230-31.

²³⁰ Marita Carnelley, *Publish or Perish*, 21 *POTCHEFSTROOM ELEC. L.J.* 1, 3 (2018). See also IMAD A MOOSA, *PUBLISH OR PERISH. PERCEIVED BENEFITS VERSUS UNINTENDED CONSEQUENCES* (2018).

²³¹ P. Nivethadevi, C. Swaminathan &, P. Kannan, *An Analytical Study on Rating of Agricultural Research Publications*, 45(98) *IJRASET* 907, 909, 911-12 (2020).

repositories.²³² The barrier may still exist to a certain extent.²³³ Of 53 American university publishers (members of the Association of American University Presses (AAUP)), 9.8% indicated that publications of TD were always welcome, 43.9% reported that a decision is made on a case-by-case basis, 26.8% welcomed a publication only if it was substantially different from the one already circulated, and 7.3% indicated that they would not consider publishing the open access TD at all.²³⁴ This suggests that if a mandatory policy of wide circulation of TD in institutional repositories is adopted, some journals and publishers would generally adjust their policies to allow concurrent publication.

Another way to overcome this hurdle is to rank the platforms on which the TD are made available. Yet, it should be noted that the current determination of the appropriate ranking method for academic publications is controversial, therefore it should be considered carefully with regard to TD.²³⁵ The most important question concerns the principles of TD ranking, and whether the current method of journal ranking, the impact factor,²³⁶ which is based on the number of citations, should be followed. Citations were shown to be subject to biases and manipulations, and therefore are an inaccurate means for assessing the quality of a journal or of an article.²³⁷ The academic ranking culture has been criticized for relying too heavily on quantitative measurements instead of an in-depth qualitative assessment of each research.²³⁸ An alternative ranking systems is the article level metrics (Almetrcis) method that takes into account the impact factor of the journal, the number of citations of the article, the number of views and downloads of the article, and the number of discussions about the article on social media, blogs, and news websites.²³⁹ The advantage of the Almetrics method is that it assesses individual

²³² Marisa L Ramirez, Joan T. Dalton, Gail McMillan, Max Read and Nan H. Seamans, *Do Open Access Electronic Theses and Dissertations Diminish Publishing Opportunities in the Social Sciences and Humanities? Findings from a 2011 Survey of Academic Publishers*, 74(4) COLL. & RSCH. LIBRARIES 368, 370 (2013).

²³³ *Id.*, at 377.

²³⁴ Ramirez et al, *supra* note 232 at 374. See also Jill Cirasella & Polly Thistlethwaite, *Open Access and the Graduate Author: A Dissertation Anxiety Manual*, in OPEN ACCESS AND THE FUTURE OF SCHOLARLY COMMUNICATION: IMPLEMENTATION 203, 206 (Kevin L. Smith and Katherine A. Dickson eds., 2017).

²³⁵ Benedikt Fecher & Sascha Friesike, *Open Science: One Term, Five Schools of Thought*, in OPENING SCIENCE: THE EVOLVING GUIDE, *supra* note 85, at 17, 40.

²³⁶ KANJILAL & DAS, *supra* note 118, at 63.

²³⁷ *Joint Comm. on Quantitative Assessment of Research, Citation Statistics* (June 12, 2008), <http://www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf>; Fenner, *supra* note 203, at 184

²³⁸ Mathias Binswanger, *Excellence by Nonsense: The Competition for Publications in Modern Science*, in OPENING SCIENCE: THE EVOLVING GUIDE, *supra* note 85, at 49, 53 (Sönke Bartling & Sascha Friesike eds., 2014).

²³⁹ This method is based on the use of several different rating tools. Among other things, the method is based on Journal Impact Factor method, Hirsch's H-Index method and several other rating methods, see KANJILAL & DAS, *supra* note 118, at 63. Fenner, *supra* note 203, at 183-187. Regarding Hirsch's H-Index method see KANJILAL & DAS, *supra* note 118, at 63-65. See also methods such as the Google citation model, the POP (Publish or Perish) method, and other methods KANJILAL & DAS, *supra* note 118, at 65-66.

articles, not merely the ranking of the journal,²⁴⁰ alleviating some of the flaws of the impact factor method, based on the number of citations. Although the Almetrics method is based on quantitative measurements as well, it uses a range of factors that are transparent.²⁴¹

Given the failures of the current rankings systems of journals ,a specially designated ranking for TD should be considered ,using measures that assess each research .Note that the institutions where the TD have been conducted are known ,and in many countries ,higher education institutions are themselves ranked. Therefore, the TD ranking system may be needed in particular for graduates of institutions that are not regarded as "first tier", to allow them to gain personal reputation which is disconnected from their institution. The dedicated ranking for TD will serve the advanced degree students' interest in reaping the academic benefit of their research and facilitate the adoption of a mandatory policy of circulating TD in designated repositories.

Last, students may request a 2-3 year embargo period to allow prior publication of the TD granting full exclusivity to the publisher.²⁴² In the case of commercial publishers, the embargo also allows recovering the investment and gaining profit. Such publication should be subject to a general norm whereby after the end of the embargo, the TD is circulated in the designated open access repository.

C. Copyright Concerns

Copyright may also raise difficulties to promoting open access TD repositories. Some challenges relate to past TD, others to contemporary ones. In the pre-digital world, a physical copy of TD was deposited in the institution library.²⁴³ Access to old TD has scientific importance, based on the arguments of open science, and particular importance for tracking the development of knowledge and scientific perceptions of various themes.²⁴⁴ Therefore there is a public need to digitize old TD to enable their access in the repositories.²⁴⁵ But copyright concerns may raise barriers to making old TD available digitally. The students, who are the authors of the TD, are presumably the copyright owners, therefore it may be claimed that digitization of the TD and their dissemination infringe the students' copyright.²⁴⁶

²⁴⁰ Fenner, *supra* note 203, at 184.

²⁴¹ Binswanger, *supra* note 238, at 61.

²⁴² KANJILAL & DAS, *supra* note 118, at 22.

²⁴³ Pamela Samuelson, *The Google Book Settlement as Copyright Reform*, 2011 WIS. L. REV. 479, 493-494 (2011).

²⁴⁴ Tatiana Sanches, *Shrink to Fit or Prune to Strengthen: Adapting the Strategic Plan in an Academic Library as Response to Environmental Change*, 24 NEW REV. OF ACAD. LIBRARIANSHIP 310, 322-323 (2018).

²⁴⁵ *Id.*

²⁴⁶ Tatjana Brzulović Stanisavljević & Dragana Stolić, *Digitization of Doctoral Dissertations as a Part of Scientific Heritage: Objectives, Mission and Copyright Issues*, NFORUM 26, 26-27 (2015). See also Karlene Robinson, Audrey Saddler, Maureen Kerr-Campbell, Sonia Patrickson Stewart & Godfrey Walker, *Digital Accessibility:*

Concerns about copyright infringement may be allayed by a record of consent given by the student to such acts, whether explicit or implicit, or by relevant bylaws of the institution that settled the use of the TD. A few decades ago it was less common to require the students' consent, and such records are often difficult to track. Many institutions did not have a clear policy on the matter.²⁴⁷ Therefore, as with other cases of digitizing old copyrighted materials, academic libraries would need to adopt a policy concerning the digitization of old TD. This issue is beyond the scope of the present paper, but it may be suggested that TD are a special case in this regard as well. The digitization of other copyrighted materials and orphan works by libraries has been extensively discussed by policymakers and in the literature,²⁴⁸ yet not enough public attention has been paid to the special case of digitizing TD.

The US fair use doctrine, which permits the use of copyrighted works in various circumstances, may be applied in cases of digitizing and circulating old TD. Under US copyright law, the fair use of copyrighted works for "purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research" is not an infringement of copyright.²⁴⁹ The fair use doctrine is based on a four-factor analysis determined retroactively by the court: the purpose and character of the use, the nature of the used work, the amount taken, and the potential market harm.²⁵⁰ Fair use is an open norm that allows its application to new types of uses, which were not anticipated by the legislature, whenever it is necessary to achieve the intended purpose of the copyright. Given the special nature of TD, as discussed above, it is reasonable to expect a fair use finding in cases of institutional digitization of old TD. Preservation of TD is needed primarily for scholarship and research, which are enumerated as purposes supporting a fair use finding.²⁵¹ Furthermore, the digitization and preservation will be carried out by non-profit institutions of higher education, for non-commercial needs, and publishing relatively old research will not harm the potential market value of the TD, but mainly revive exposure for the research and its author. Outside the US, in many countries, there are special exceptions to copyright aimed at promoting scholarship and research, and the non-

Overcoming the Challenges of Managing Grey Literature in Jamaica: The Case of the University of the West Indies Mona Library, 79 *THE SERIALS LIBRARIAN* 326 (2020),

²⁴⁷ *Id.*

²⁴⁸ See, e.g., Giancarlo F. Froisio, *Google Books Rejected: Taking the Orphans to the Digital Public Library of Alexandria*, 28 *SANTA CLARA COMPUT. & HIGH TECH. L. J.* 81 (2011); Katharina de la Durantaye, *H is for Harmonization: The Google Book Search Settlement and Orphan Works Legislation in the European Union*, 55 *N.Y. L. SCH. L. REV.* 157 (2010); Jonathan Band, *The Long and Winding Road to the Google Books Settlement*, 9 *J. MARSHALL REV. INTE'L. PROP. L.* 227 (2009).

²⁴⁹ 17 U.S.C. § 107 (2014).

²⁵⁰ *Id.*

²⁵¹ *Id.*

commercial and non-injurious character of the use may support its legitimization worldwide.²⁵²

A different obstacle stemming from copyright, which concerns contemporary practice, is the new trend allowing PhD students to publish a line of articles in scientific journals, replacing the single final dissertation.²⁵³ In such cases, the students are expected to publish their research outside the institution, and each publication is expected to meet the scope of a research paper rather than that of a TD.²⁵⁴ Such publications are not identified by the student as part of their advanced degree studies, and are regarded as routine scientific publications by the publishers. The question is therefore whether these articles should also be included in the TD repositories, and if the answer is affirmative, how such inclusion may be settled with potential copyright claims of the publishers. As this trend becomes more popular, a systematic and uniform solution should be devised. One option is to exempt these PhD articles from the general policy regarding open access to TD because they do not have the characteristics of TD in scope and standards. Other options are to require students to identify these articles as part of their PhD studies, which necessitates publication in institutional repositories, or to require the publication of these articles in open access journals, and support the cost demanded by the publishers to that end.

D. Technical Barriers

The proposed scheme of open access TD repositories aspires to create a global network where scholars and the public have full access to all TD worldwide. Some technical barriers may hinder the accomplishment of this vision. One obstacle is the "survival" of digital archives and concerns with their long-term operational infrastructure. The fear is that the digital materials will not be well preserved.²⁵⁵ Various solutions may be used to overcome this technical obstacle, which are expected to emerge in the future. For example, the e-Depot project of the National Library in the Netherlands compiles articles according to the standard of the Open Archival Information System (OAIS),²⁵⁶ which enables the permanent

²⁵² See, e.g., Sec. 29, The Copyright Act, R.S.C., 1985, c. C-42 (Can.); CCH Canadian Ltd. v. Law Society of Upper Canada, [2004]; Sec. 29, The Copyright, Designs and Patents Act 1988 (UK).

²⁵³ Deem & Dowle, *supra* note 9, at 153-154; Jet Katgert & Trudi Noordermeer, *The Dissertation in the Twenty-First Century*, in HORA EST!, *supra* note 8, at 91, 93.

²⁵⁴ Deem & Dowle, *supra* note 9, at 157.

²⁵⁵ See, e.g., John W. Lamp, *Open Access: Just One Item in a Pandora's Box*, 34 COMM. ASS'N FOR INFO. SYS. 366, 368 (2015); WALT CRAWFORD, *supra* note 88, at 27-28, 33-35; Heather Morrison, *Small Scholar-Led Scholarly Journals: Can They Survive and Thrive in an Open Access Future?*, 29 LEARNED PUB. 83 (2016)

²⁵⁶ See ISO standard ISO 14721: 2003; replaced in 2012 by the ISO 14721: 2012 standard. This standard enumerates the various responsibilities that an archive must meet to be recognized as a long-term archive. See also the LOCKSS (Lots of Copies Keep Stuff Safe) project, established in 1999 at Stanford University, which sets some criteria for ensuring long-term archiving, KANJILAL & DAS, *supra* note 118, at 28; *Preservation Principles*, LOCKSS, <https://www.lockss.org/about/principles>, (last visited May 23, 2022).

storage of all materials.²⁵⁷ Some of the leading publishers are partners in the e-Depot project, including Elsevier, Oxford University Press, Springer, and others.²⁵⁸ Another project aimed at establishing a long-term archive was initiated by the Directory of Open Access Journals (DOAJ) in collaboration with the Swedish Libraries Association and the e-Depot project, allowing all open access journals to store their articles permanently on this system.²⁵⁹ The same solutions can be applied to TD repositories, guaranteeing their long-lasting archiving. Other solutions exist for maintaining long-term archiving, such as the German model imposing the obligation of establishing the adequate infrastructure on the national library.²⁶⁰ Long-term archiving must also address the technical issues concerning the retrieving of information, which is subject to various standards.²⁶¹

Opening access to TD is not always enough, and additional technical barriers to full accessibility may need to be removed.²⁶² Of these, the language barrier is the most severe. TD may be written in many languages, and if the aim is to accelerate the development of knowledge worldwide and to promote efficiency, the language obstacle must be overcome. Although there are currently various developments in automatic translation, machine translations have not yet matured into trusted systems.²⁶³

VI. CONCLUDING REMARKS

TD are academic research products with unique characteristics. They are the final written works required to qualify for advanced academic degrees, in particular PhDs. The role of advanced academic degrees has changed over the years from training the future cohorts of university teachers and scholars to the preparation of the professional workforce. Yet, TD of all kinds are assessed according to strict requirements for meeting

²⁵⁷ *e-Depot - The National Archives of the Netherland*, <https://www.nationaalarchief.nl/>, (last visited May 23, 2022).

²⁵⁸ See the list of archiving partners at the website of the *National Library of the Netherlands: Archiving Partners - Royal Library*, <http://www.kb.nl/en/organisation/research-expertise/long-term-usability-of-digital-resources/archiving-partners> (last visited May 23, 2022).

²⁵⁹ Sonja Brage, *Directory of Open Access Journals and Its Impact on the Open Access Movement with a Special Perspective on Latin America* (2011).

²⁶⁰ Ute Schwens & Reinhard Althenhöner, *Open Access and Long-term Archiving*, in *OPEN ACCESS: OPPORTUNITIES AND CHALLENGES* 59 (Eur. Comm'n & Ger. Comm'n for UNESCO, 2008).

²⁶¹ Wolfram Horstmann, *Data-processing, Date-Transfer and Search: Further Technical Challenges for Open Access*, in *OPEN ACCESS*, *supra* note 260, at 66, 66-67 (Eur. Comm'n & Ger. Comm'n for UNESCO, 2008).

²⁶² Peter Suber, *Creating an Intellectual Commons Through Open Access*, in *UNDERSTANDING KNOWLEDGE AS A COMMONS: FROM THEORY TO PRACTICE* 171 (Charlotte Hess & Elinor Ostrom eds., 2006).

²⁶³ Suber, *supra* note 262. See also Sam Berner, *Lost in Translation: Cross-Lingual Communication, and Virtual Academic Communities* (2003), <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.130.2973&rep=rep1&type=pdf>, (last visited May 23, 2022).

high academic standards. TD represent the flagship of scientific progress and must show significant contribution to the relevant field.

The progress of science is incremental. In the last decades, there has been growing awareness of the need to open science for the sake of the public good. The underlying agenda is to allow the public and the academic community worldwide to access the products of research. The open science movement and the growing acknowledgment of the right to research are gaining much attention and legal recognition, and various initiatives have emerged within its framework, including the open access publication format, aimed at replacing the "behind paywalls" model that hinders access to research.

Despite the importance of an open access policy particularly to TD, there is no uniform global standard in the matter. Various projects around the world have attempted to establish a comprehensive TD database, but all are based on voluntary participation, and occasionally on commercial interests. Our survey confirmed that there is no unified standard. Although many (but not all) academic institutions operate electronic TD repositories, they are not always open to the public at large but only to the closer academic community, and these repositories are not necessarily differentiated from the general institutional repository. The result is that there is no global access to TD, and in practice, science is closed.

We propose a mandatory policy for global open access to TD. The uniform standard needed for the "open worldwide web of TD" requires international cooperation. Coordination between countries and between institutions in each country is indispensable for building interconnected open access repositories designated for TDs. Several arguments support such a policy. We have listed the prominent reasons. First, we offered a novel reconceptualization of TD as a unique academic product that provides students with social and economic benefits – cultural capital, in Bourdieu's terms²⁶⁴ – that justifies the disclosure of the knowledge to society. This reasoning is also underlying patent law, known as the "social contract" principle, in which the patentee acquires exclusivity and in exchange must fully disclose the invention to the public worldwide. Next, we discussed accepted arguments supporting the open access initiatives, which are particularly compelling with regard to TD. We reviewed public expenditure and academic innovation policies that require fair and efficient treatment of the fruits of public investments. The effort associated with training advanced degree students is immense, and it involves a significant investment of financial and other resources. Therefore, TD in particular should be subject to a stringent open access policy.

The open science movement celebrates a significant milestone with the adoption of the UNESCO Recommendation on Open Science, in November 2021. The agenda of the open science movement should be translated into concrete measures. The vision of an open worldwide web

²⁶⁴ Pierre Bourdieu, *Cultural Reproduction and Social Reproduction*, in 71 KNOWLEDGE, EDUCATION AND SOCIAL CHANGE: PAPERS IN THE SOCIOLOGY OF EDUCATION, (R. Brown Tavisock ed., 1973).

of TD is feasible, with not many barriers to overcome, and may be a good starting point to turn the ethos of open science from science fiction into reality.