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PROTOCOL: A Scoping Review of Graduate Student Education, Curriculum Impact, and Interest in Interdisciplinary Research Training

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Introduction:

Alongside traditional graduate education practices, implementing curriculum focused on providing interdisciplinary research training to graduate students may help support their academic development. This additional educational focus can bolster graduate student understanding of methodological practices, develop alternative routes of thinking or approaching a problem/ issue/ topic, may assist in developing student professional socialization skills, and may positively impact student internal motivations, beliefs, and perceptions. Spelt et al. conducted a systematic review identifying and discussing interdisciplinary higher education.[1] Their study developed a strong base of interdisciplinary higher education information while providing information on directions future research could pursue.[1] However, from our background literature search, we were unable to identify any scoping or systematic literature reviews identifying specific information surrounding graduate level interdisciplinary education and training. In this study we will conduct a scoping review on interdisciplinary graduate education and training to provide a baseline understanding of current knowledge

Review Questions:

- What factors are associated with a successful or an unsuccessful implementation of interdisciplinary research training among graduate students?

- Do graduate students have motivational improvements or show methodological knowledge improvements while working on interdisciplinary research projects?

- Are graduate students interested in interdisciplinary research and/or interdisciplinary research training?

Methods:

Protocol:

Our scoping review protocol was developed utilizing the Joanna Briggs Institute guidance, by Peters et al., and supplemented by a scoping review conducted by Tricco et al.[2,3] This study's protocol has been developed *a priori* in accordance with scoping review guidance. However, this protocol may undergo an iterative process, wherein if information is found that would necessitate changes to be made to the research questions or study methodology, said alterations would occur and will be reported in the final results. This scoping review's primary focus is on graduate student education and training in interdisciplinary practices and research. Where we will aim to identify graduate education and training information around current practices, interdisciplinary program implementation, graduate student perceptions of interdisciplinary education, outcomes from implemented pedagogical strategies, and information around graduate student improvements associated with interdisciplinary curriculum. Studies for inclusion should focus on graduate student education or training. However, exceptions may be made in the event an article is found that focuses on a different collegiate level student population while also examining a facet of interdisciplinarity relevant to graduate student education or training.

Literature Search Criteria and Process:

This study will utilize the University of Mississippi Libraries' (UML) 'One Search' for all literature searches conducted under this protocol.[4] UML One Search searches through over 410 databases, including EBSCO Host, ERIC, ProQuest, Science Direct, Teaching Reference Center,

EconLit, PsychINFO, and SocINDEX, among other databases rich with information (see Appendix B).[5] Article searches will utilize a set list of search terms for information exploration. These terms will include 'interdisciplinary,' 'graduate,' 'education,' 'higher education,' 'training,' 'research,' 'implementation,' 'successful,' 'unsuccessful,' 'motivation,' 'knowledge,' and 'interest.' All searches will include the 'interdisciplinary' search term. All searches will use at least two additional search terms, added using 'AND' Boolean logic statements. As an example of a potential search including the search terms 'interdisciplinary,' 'graduate,' and 'education,' the search will be entered as follows: (interdisciplinary) AND (graduate) AND (education). 'Student' as a search term will not be used as it has been reported to produce too many extraneous results.[1] All search terms and associated Boolean logic terms will be recorded to maintain a record for study personnel and to be reported later. In alignment with the inclusion and exclusion criteria in this protocol, all searches will only include peer-reviewed journal articles that were published between January 1st, 2000 and December 31st, 2020 that are available in English.

This study will utilize two article reviewers to ascertain a set of articles less influenced by individual biases. Additionally, a third member of study personnel will serve as a moderator and assist in evaluating the inclusion/exclusion of articles conducted by the two article reviewers and helping to settle any discrepancies between the two article reviewers. Study inclusion will consist of three phases: Identification, Screening, and Eligibility (see Appendix A). During the identification phase, all search results will have their titles and abstracts reviewed for relevance to graduate student training and education in interdisciplinary practices and research, with relevant articles meeting initial inclusion. During the screening phase, the two

article reviewers will discuss which articles to include between their searches and have a third individual review any disagreements that may occur. Additionally, all duplicates will be removed during the screening phase. During the eligibility phase, each article included by this point will be read through in their entirety and relevant information will be extracted and recorded for later reporting. Articles may still be excluded at this phase with a valid explanation as to why they should not be included.

Study Inclusion and Exclusion Criteria:

Articles will meet the inclusion criteria if they are available as a full text, are peer reviewed, are published in a scholarly journal, are published in English, and were published between January 1st, 2000, and December 31st, 2020. All study designs will meet the inclusion criteria. If an article, is not available as full text from the University of Mississippi, an interlibrary loan will be completed to attempt to obtain the material. Exclusion criteria will be met if an article is not peer-reviewed, is published in a language other than English, or if it was published before 2000 or after 2020. Contrary to guidance from the Joanna Briggs Institute, this study will only include articles that have already been published in peer reviewed formats, 'grey literature' (literature that has yet to be published) will be excluded. Emphasis has been placed on articles published in English as study personnel are limited to understanding it as a language, future scoping or systematic reviews could be completed where study personnel have proficiencies in other languages.

Article Quality Appraisal:

We will not be appraising the quality of included articles outside the basis of our inclusion and exclusion criteria. This omission of a quality appraisal is based on the recommendations from the Joanna Briggs Institute Guidance and the scoping review from Tricco et al.[2,3] Future systematic reviews could conduct quality appraisals of articles included under this study protocol.

Result Reporting:

Throughout the literature review process involved in this study, a record will be maintained that details what studies have been considered for inclusion. The number of studies that were reviewed at individual stages of the scoping review will be reported in the results write-up for this study. Studies that meet the final inclusion criteria will be discussed in the final article developed from this study's scoping review process. If a study does not meet all inclusion criteria; it will not specifically be mentioned or discussed, but it will be included in the count of articles excluded at various stages of the review process. All results will be discussed by the two reviewing research team members and mediation will occur if any disagreements or concerns arise.

Study Limitations:

This study has limitations that originate from its design protocol. Individual study personnel reviewing articles for inclusion may have an inherent bias as to which information they select for study inclusion; however, this is being controlled for by having more than one article reviewer and having a third member of study personnel evaluate the inclusion/exclusion

decisions of the article reviewers. Individual biases may also affect reporting of identified articles, but this is being controlled for by maintaining two individuals reviewing articles and a third individual serving as a moderator in case of disagreement. As we are not evaluating the quality of any included article for this study, it is possible that an included article may not meet a sufficient level of quality, but we will control for this by only selecting articles that have been peer reviewed and published in a scholarly journal.

Timeline:

This study is expected to take four months wherein the initial search phase is anticipated to take a month, a month for the review and inclusion/exclusion process, a month for the information analysis and discussion, and a month for final write up.

Budget:

This study has no planned budget as the UML One Search is freely available to all students, staff, and faculty at the University of Mississippi.
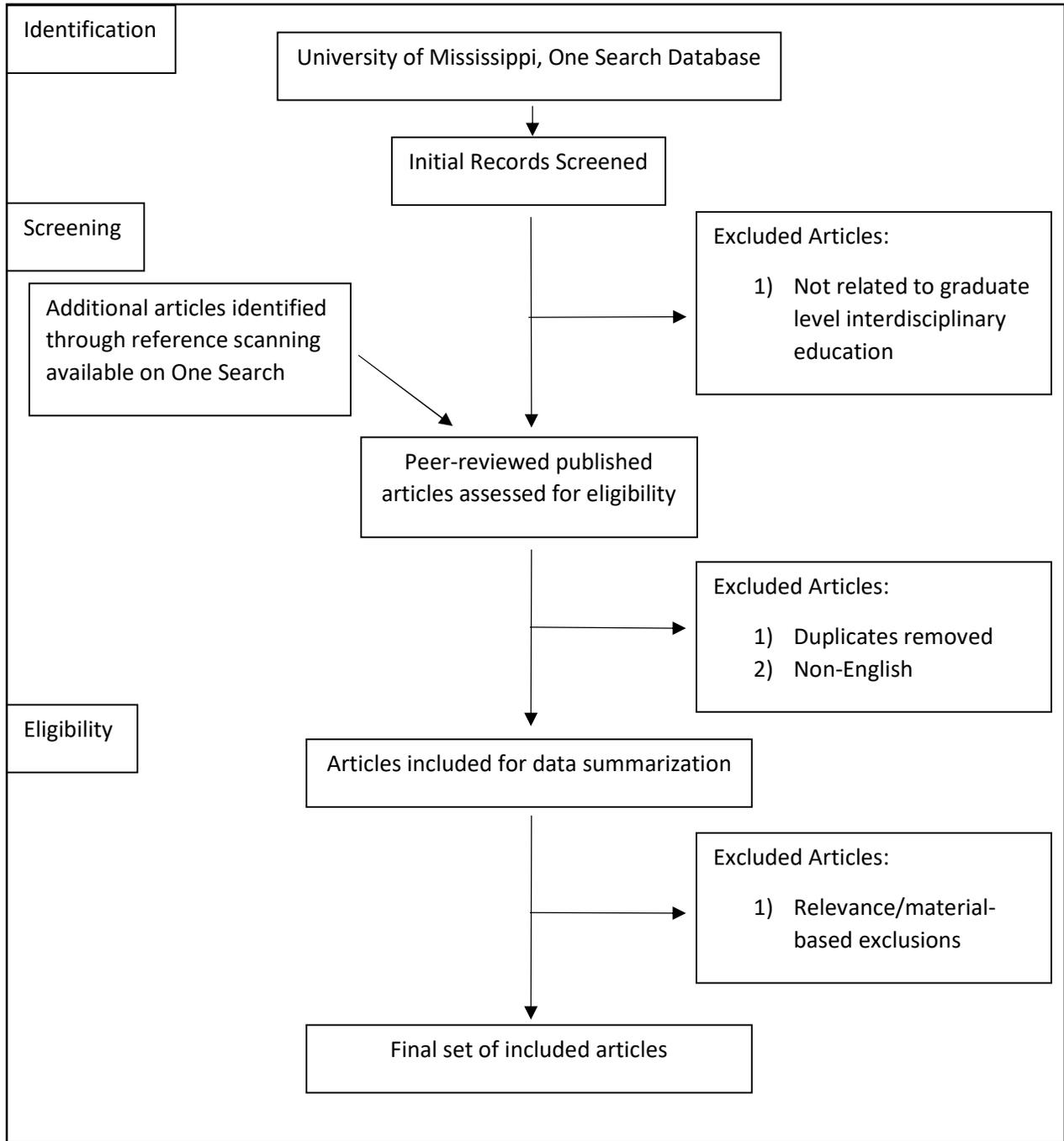
IRB Statement:

Since this project has no human participants and will only entail searching through currently published and peer reviewed materials, it does not need to be submitted to the University of Mississippi Institutional Review Board.

References:

1.   Spelt, E. J. H., Biemans, H. J. A., Tobi, H., Luning, P. & Mulder, M. Teaching and Learning in Interdisciplinary Higher Education: A Systematic Review. *Educ. Psychol. Rev.* **21**, 365–378 (2009).

2.   Peters, M. *et al.* Guidance for conducting systematic scoping reviews. *Int. J. Evid. Based Healthc.* **13**, (2015).

3.   Tricco, A. C. *et al.* A scoping review on the conduct and reporting of scoping reviews. *BMC Med. Res. Methodol.* **16**, 15 (2016).

4.   The University of Mississippi. One Search. *The University of Mississippi Libraries* https://libraries.olemiss.edu/.

5.   The University of Mississippi. One Search: A-Z Databases. https://guides.lib.olemiss.edu/az.php.

Appendix A: Scoping Review Flowchart

Appendix B: One Search Database List

A

Abstracts in Anthropology

Academic Search Premier

Academic Video Online @ Alexander Street Press

Academic Video Online @ ProQuest

Access World News

Accounting and Tax

ACLS Humanities E-Book Collection

ACM Digital Library

ACM Guide to Computing Literature

ACS Journals

Advertising Red Books via Winmo

AEA Web

African American Communities

African American Newspapers, Series 1, 1827-1998

African American Poetry

African American Police League Records 1961-1988

African Diaspora, 1860-Present

African Journals Online

Agricola

AHD.com : American Hospital Directory

AHFS Consumer Medication Information

Air University Library Index to Military Periodicals

AllAfrica

Alt HealthWatch

America: History & Life

American Antiquarian Society (AAS) Historical Periodicals Collection: All Series

American Civil War Collection, 1860-1922

American Civil War: Letters and Diaries

American Fact Finder

American Film Institute Catalog

American History, 1493-1945

American Indian Histories and Cultures

American Indians and the American West, 1809-1971

American Periodicals Series

American Poetry

American Slavery Collection, 1820-1922

American West

Annual Review of Psychology

Annual Reviews

AnthroSource

Apartheid South Africa 1948-1980

Approved Drug Products with Therapeutic Equivalence Evaluations

ArchiveGrid

Archives Unbound

Art & Architecture Complete

ARTFL

Article First

Artstor Digital Library

ASCE Civil Engineering Database

Associated Press Stylebook Online

ATLA Religion Database with ATLASerials

Atlanta Constitution (1868-1984)

Atlanta Daily World (1931-2003)

Atlas of Rural and Small-Town America

Audio Drama: The L.A. Theatre Works Collection

B

Baltimore Afro-American

Best's Library Center

Bibliography of British and Irish History

Bibliography of Native North Americans

Biological Abstracts

BioOne

Black Abolitionist Papers

Black Drama: Third Edition

Black Freedom Struggle in the 20th Century.

Black Historical Newspaper Collection

Black Studies Center

Black Thought and Culture

Bloomberg BNA: Tax and Accounting Center

Book Collection: Nonfiction

Brill Islamic Studies Online: Reference Works

British Periodicals

BrowZine

Business Expert Press

Business Source Complete

C

C19: The Nineteenth Century Index

Cabell's Directories of Publishing Opportunities

Cambridge Companion to Music

CCH IntelliConnect

Central Intelligence Agency

Chicago Defender, The (1910 - 1975)

Chicago Manual of Style

China, America and the Pacific: Trade and Cultural Exchange

China: Culture and Society

China: Trade, Politics & Culture

Chinese Newspaper Collection (1832-1953)

Christian Science Monitor (1908-2007)

Chronicle of Higher Education Online

Chronicling America

Church Missionary Society Periodicals

CINAHL Plus with Full Text

Civil War Era

Civil War: A Newspaper Perspective

Cleveland Call & Post (1934-1991)

Cochrane Library

ComDisDome

Communication and Mass Media Complete

Computer Source

Computers & Applied Sciences Complete

Confederate Military Manuscripts and Records of Union Generals and the Union Army

Confidential Print: Africa, 1834-1966

Confidential Print: Latin America, 1833-1969

Confidential Print: Middle East, 1839-1969

Confidential Print: North America, 1824-1961

Congressional Publications

Congressional Serial Set

Consumer Brand Analytics

Consumer Health Complete

Coronavirus Research Database

Counseling and Therapy in Video

CQ Press Voting and Elections Collection

CQ Researcher

CRC Handbook of Chemistry and Physics

Criminal Justice Abstracts

D

Defining Gender

Department of Justice

Detroit Free Press (1831-1999)

Dictionary of American Regional English

Dictionary of Literary Biography

Dictionary of Old English Corpus

Dictionary of Old English: A to I

Digital National Security Archive

Digital Sanborn Maps 1867-1970

Digital Theatre+

Directory of Open Access Journals

Dissertations & Theses Global

Dissertations & Theses: University of Mississippi

E

Early American Newspapers, Series 6

Early English Books Online

Early English Books Online:Text Creation Partnership

Ebook Central

Ebook Central Academic Complete

Ebook Central Social Sciences Collection

eBooks on EBSCOhost

EBSCOhost (Academic Search)

EconLit

Educational Administration Abstracts

Eighteenth Century Collections Online

Eighteenth Century Drama: Censorship And The Stage

Eighteenth Century Journals

Emerald Management 120

Empire Online

English Poetry

Environment Complete

ERIC (via EBSCO)

ERIC (via Institute of Education Sciences)

Ethnic NewsWatch

Ethnographic Sound Archives Online

European Views of the Americas: 1493-1750

Everyday Life & Women in America c.1800-1920

F

Fannie Lou Hamer: Papers of a Civil Rights Activist, Political Activist, and Woman

FBI Confidential Files and Radical Politics in the U.S., 1945-1972

FBI File: House Committee on Un-American Activities (HUAC)

FBI File: Watergate

Federal Aviation Administration

Federal Bureau of Investigation

Federal Election Commission

FIAF International Index to Film Periodicals

Film Index International

Films on Demand

First World War

FirstSearch Databases

Food Chemicals Codex (FCC) Online

Food Studies Online

Foreign Office Files for China, 1919-1980

Foreign Office Files for India, Pakistan and Afghanistan, 1947-1980

Foreign Office Files for the Middle East, 1971-1981

Frontier Life: Borderland and Colonial Encounters

Funk & Wagnalls New World Encyclopedia

G

Gale Virtual Reference Library

Garden, Landscape & Horticulture Literature Index

Gender Studies Database

GeoRef

Geoscience World

Global Commodities: Trade, Exploration and Cultural Exchange

Google Scholar

Grand Tour

GreenFILE

Guardian (1821-2003) and The Observer (1791-2003)

H

HAPI: Hispanic American Periodicals Index

HathiTrust

HeinOnline

Historical Abstracts

History Reference Center

Homeland Security Digital Library

Hospitality & Tourism Complete

Humanities International Complete

I

IBISWorld

ICE Virtual Library

ICPSR

IEEE Xplore

Index Islamicus

Index to Medieval Art

India, Raj and Empire

Information Science & Technology Abstracts (ISTA)

Ingenta

INSPEC

Intelex Past Masters

International Bibliography of Theatre & Dance

International Pharmaceutical Abstracts

IPA Source

J

James Meredith, J. Edgar Hoover, and the Integration of the University of Mississippi

Japan Times Archives

Jewish Life in America, c1654-1954

JoVE Unlimited - Science Education

JoVE Unlimited - Video Journal

JSTOR

K

Kanopy Streaming Video

Key Business Ratios

L

L'Annee Philologique

Labor Unions in the U.S., 1862-1974: Knights of Labor, AFL, CIO, and AFL-CIO

Latin American Intelligence Service

Legal Collection

Leisure, Travel & Mass Culture: The History of Tourism

LexiComp Online

LexisNexis

LGBT Magazine Archive

LGBT Thought and Culture

LGBTQ+ Source

Library Literature & Information Science Full Text

Library, Information Science & Technology Abstracts (LISTA)

Linguistics and Language Behavior Abstracts (LLBA)

Literary Manuscripts from the Henry W. and Albert A. Berg Collection of the New York Public Library

Literary Manuscripts, 17th and 18th Century Poetry from the Brotherton Library, University of Leeds

Literary Reference Center

Literature Criticism from 1400 to 1800

Literature Online

London Low Life

Los Angeles Sentinel (1934-2005)

M

Macmillan Cabinet Papers, 1957-1963

Making of Modern Law: Primary Sources, 1620-1926

Margaret Sanger Papers: Smith College Collections and Collected Documents

MarinLit

Market Research and American Business Reports, 1935-1965

MAS Ultra

Mass Incarceration and Prison Studies

Mass Observation Online Archive, 1937-1967

MasterFILE Premier

MathSciNet

Medieval Family Life: The Paston, Cely, Plumpton, Stonor and Armburgh Papers

MEDLINE (via Ebsco)

MEDLINE (via PubMed)

Meiji Japan: The Edward Sylvester Morse papers (ca. 1858-1925)

Mental Measurements Yearbook with Tests in Print

Mergent Archives: Digital Manuals, WebReports, and Key Business Ratios

Mergent Historical Annual Reports (1844-present)

Mergent Intellect

Mergent Online

Met Opera on Demand

Middle and Junior High Core Collection

Middle Search Plus

Migration to New Worlds

Mississippi Members of Congress

Mississippi Newspapers

MLA Directory of Periodicals

MLA International Bibliography

Music Periodicals Database

N

NAACP Papers

Nashville Tennessean (1812-2002)

National Academies Press

National Aeronautics and Space Adminstration

National Archives

National Journal's Policy Central

National Security Agency

National Theatre Collection

Natural Medicines

Naxos Jazz Library

Naxos Music Library

NBER Working Papers

NCJRS Abstracts

New York Amsterdam News

New York Times, The (1851 - 2017)

New York Times, The (2008 - recent)

Newspaper Source

Nexis Uni

Nineteenth Century Collections Online: Asia and the West

Nineteenth-Century Literature Criticism

Nixon Years, 1969-1974

Norfolk Journal and Guide (1921-2003)

NoveList

O

Observer: News for the American Soldier in Vietnam, 1962-1973, The

One Search

OnePetro

Ovid Journals

Oxford Art

Oxford English Dictionary

Oxford History of Western Music

Oxford Music Online

P

Pennsylvania Gazette, 1728-1800

Perdita Manuscripts

Performing Arts Periodicals Database

Periodicals Archive Online

Philadelphia Tribune (1912-2001)

Philosopher's Index

PhilPapers

Pittsburgh Courier, The (1911-2002)

Political Science Complete

Popular Culture in Britain and America, 1950-1975

Popular Medicine in America, 1800-1900

Presidential Recordings Digital Edition

Primary Search

PrivCo

Professional Development Collection

Project Gutenberg

Project Muse

ProQuest Central

ProQuest Central: Advanced Technologies & Aerospace

ProQuest Central: Biological Science

ProQuest Central: Computer Science

ProQuest Central: Criminal Justice

ProQuest Central: Education

ProQuest Central: Engineering

ProQuest Central: Psychology

ProQuest Central: Public Health

ProQuest Central: Telecommunications

PsycARTICLES

Psychology & Behavioral Sciences Collection

Psychotherapy.net Video Collection

PsycINFO

PubMed

PubMed Central

R

Race Relations Abstracts

Real Estate and REITs

Reconstruction and Military Government after the Civil War

Reconstruction of Southern States: Pamphlets

Regional Business News

Religion & Philosophy Collection

Revolutionary War and Early America: Collection from the Massachusetts Historical Society, 1721-1860

RIA Checkpoint

Richard K. Miller Market Research Handbooks

RILM

Romanticism: Life, Literature and Landscape

Roper Center For Public Opinion Research

S

Sage Premier

Sage Research Methods

Salem History Online

Sanborn Maps 1867-1970

Science.Gov

ScienceDirect

Scientific Electronic Library Online (SciELO)

SciFinder-n

Scopus

Screen Studies Collection

Senior High Core Collection

Serials Directory

Shakespeare in Performance: The Folger Shakespeare Library Prompt Books

Shock and Vibration Digest

Short Story Index (H.W. Wilson)

Simmons Insights

Slavery and the Law

Slavery in Antebellum Southern Industries

Slavery, Abolition and Social Justice, 1490-2007

Social Explorer

SocINDEX with Full Text

Southern Life and African American History, 1775-1915; Plantation Records

SportBusiness Media

SPORTDiscus

Sports Market Analytics

Springer

SRDS

St. Petersburg Times/Tampa Bay Times (1901-2009)

Statista

Statistical Abstract of the United States

Statistical Abstract of the World

Struggle for Women's Rights: Organizational Records, 1880-1990

Swank Motion Pictures

T

Taylor & Francis Online

Teacher Reference Center

Teaching Channel Videos

Temperance and Prohibition Movement, 1830-1933

The Sunday Times Historical Archive, 1822-2016

The Times Digital Archive, 1785-2014

Times of India (1838-2007)

TOPICsearch

Travel Writing, Spectacle and World History

TRID

Twentieth Century Religious Thought: Christianity

Twentieth Century Religious Thought: Islam

U

U.S. Citizenship and Immigration Services

U.S. Congressional Serial Set

U.S. Department of State Freedom of Information Act

U.S. Patents, 1971+

U.S. Serial Set and Maps Digital Collection

UNdata: A World of Information

Underground and Independent Comics

Union Lists of Periodicals

USP Dictionary Online

USPNF Online

V

Value Line Research Center

Victorian Popular Culture

Virginia Company Archives

Vocational and Career Collection

Vogue Archive

W

Wall Street Journal

Washington Post, The (1877-2001)

WebCSD

Wellesley Index to Victorian Periodicals, 1824-1900, The

Wharton Research Data Service (WRDS)

Wiley Online

Women and Social Movements in Modern Empires Since 1820

Women and Social Movements in the United States,1600-2000

Women and Social Movements, International - 1840 to Present

Women at Work during World War II: Rosie the Riveter and the Women's Army Corps

Women in The National Archives

Women Working, 1800-1930

Women's Studies International

Women's Studies Manuscripts Collections from the Schlesinger Library: Voting Rights, National Politics, and Reproductive Rights

Women's Wear Daily Archive

Workers, Labor Unions, and the American Left in the 20th Century: Federal Records

World's Fairs

WorldCat Local

#

17th & 18th Century Burney Collection of UK Newspapers

20th-Century American Newspapers, Series 2