

# In a v Literature: Implications for Nursing Education

# Kathleen Phillips, Stephen Woods, and Andrew Dudash

abstract: Librarians play a key role in the understanding, retrieval, and assessment of gray literature (also spelled grey literature) as it pertains to evidence-based clinical practice, particularly nursing. With the rise of evidence-based research and curriculum-specific requirements in advanced nursing programs, gray literature instruction has become a necessity rather than a nicety. References to gray literature are not restricted to structured literature reviews but serve broader purposes within evidence-based nursing, which aims to use the best available evidence to make informed decisions about patient care.

Given the vast landscape and varied types of gray literature, identifying resources specific to nursing and quantifying their role in evidence-based nursing are challenging. Citation analysis can be used to identify types of gray literature types commonly found in nursing studies. This article seeks to establish the need for gray literature instruction in nursing curricula.

# Introduction

Research is to see what everybody has seen and think what nobody has thought. -Albert Szent-Györgyi

lbert Szent-Györgyi's 1957 definition of research,1 which was modified from an 1851 statement by Arthur Schopenhauer,<sup>2</sup> could apply to the use of gray literature in evidence-based practice. Such practice is defined as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient . . . integrating individual clinical expertise with the best

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# available external clinical evidence from systematic research."<sup>3</sup> The goal is to provide better patient outcomes, as well as to improve the standards of care practiced by health professionals. To establish evidence-based health-care practices requires constant study, with researchers analyzing both published scholarly works and resources outside the traditional scholarly outlets, also called gray literature.

Gray literature encompasses information gathered from a variety of places. It is defined as documents "produced on all levels of government, academics, business and

# Gray literature remains an elusive set of sources, hard to define, find, and analyze

industry in print and electronic formats but which is not controlled by commercial publishers."4 Once referred to as "fugitive literature," gray literature has become a nec essary resource due to its "greater speed and flexibility of dissemination."5 Though it has achieved recognition and respect, gray literature remains an elusive set of sources, hard to define, find, and analyze. It has evolved, nevertheless, into an integral and required aspect of 23.2.

evidence-based practice. Gray literature fills gaps when research is lacking or when data are produced and dispersed across various locations and access points.

A subset of evidence-based practice is evidence-based nursing, defined as the "ongoing process by which evidence, nursing theory and the practitioners' clinical expertise are critically evaluated and considered, in conjunction with patient involvement, to provide delivery of optimum nursing care for the individual."6 Nurses serve on the front lines of providing holistic, patient-centered care, respecting the preferences and expectations of the people they treat.

Awareness and use of gray literature have become important aspects of evidencebased nursing and of the broader spectrum of evidence-based clinical practice. Nurses and midwives have embraced the delivery of research-based care,<sup>7</sup> but a variety of obstacles hinder their access to the necessary data. Despite such barriers, nurses have strong motivation to learn the skills required to practice evidence-based nursing.8

While several resources discuss gray literature for librarians and information professionals, documentation of its incorporation into nursing education is sparse. This article aims to address the following questions:

- What role(s) does gray literature play in evidence-based nursing?
- Why is gray literature instruction important in relation to evidence-based nursing?
- How is gray literature currently used in nursing publications, and what categories of gray literature are most relevant to evidence-based nursing?

# Gray Literature Use among Health Professionals

is mes Health professionals use gray literature in a variety of ways. A 2018 study of the use, citation, and creation of gray literature among health sciences faculty found that 77 percent used such literature and considered it "critical" to their work. The faculty members strongly preferred conference papers, an important type of gray literature, and cited Google Scholar and professional contacts as the primary avenues for finding them.<sup>9</sup> Whether in scholarship or the provision of care, gray literature can become a primary source of vital information.

#### Systematic Reviews and Gray Literature

Hospitals rely on up-to-date and effective treatment methods to help their patients recover. To achieve optimum care and to aid in the improvement of hospital practices and policies, nurses rely on standards of care that are set forth in evidence-based nursing. As in most evidence-based practice, such nursing typically starts with a systematic review.

Systematic reviews and meta-analyses reflect the "state of the science" and serve as a framework to guide research into practice.<sup>10</sup> A systematic review uses orderly methods, such as collecting evidence that meets predetermined criteria, to identify and summarize the findings of similar but separate studies. A meta-analysis uses statistical methods to combine the results of multiple studies to develop a conclusion that is statistically stronger. Such systematized research produces an appraisal and synthesis of multiple individual investigations, expedites expertise, identifies knowledge gaps, and may influence developmental activities. Its purpose is to aid and inform the implementation of evidence-based practice.<sup>11</sup>

Gray literature use and recognition have evolved significantly over the past several decades. As late as 1993, gray literature was not accepted as a reliable or credible resource for meta-analysis in some professions, and a manuscript that included it risked rejection by publishers or reviewers. Hesitancy to use gray literature stemmed from the concern that unpublished studies might be of lower quality or were not peer-reviewed.<sup>12</sup>

Today, the collection and analysis of gray literature are standard practice within a systematic review or meta-analysis. Gray literature is incorporated into systematic review guidelines and manuals published by such leading organizations as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocols, Cochrane, and JBI, formerly the Joanna Briggs Institute. A systematic review is often accompanied by a PRISMA diagram showing how the studies were selected for analysis. The diagram template was updated in 2020 to distinguish the process of searching within databases from the identification of materials from other sources, such as websites and organizations, which are also referred to as gray literature.<sup>13</sup> Presently, evidence of the quality of gray literature is limited, with varied findings due to the variety and context of the types of such literature.<sup>14</sup> For example, government documents tend to be well cited, conference proceedings and workshop documents mention key researchers or clinicians, and practice manuals or guidelines may be inherently comprehensive, yet these resources provide completely different information, making it difficult to uniformly assess their usefulness.<sup>15</sup> Even with the obstacles facing the collection, assessment, and inclusion of gray literature, it plays an important role in scholarly communication.

## The Importance of Gray Literature

## **Reducing Publication Bias**

Publication bias, or the likelihood of a study being published or rejected based on its results—for example, favoring studies that show significant or positive results versus

nonsignificant or negative outcomes—tends to occur in scholarly publications.<sup>16</sup> If "unflattering data" are lost as the result of a lack of published null or negative results, such bias can lead to skewed evidence-based practice.<sup>17</sup> Frequently, however, "unflattering data" are published as gray literature, such as white papers or conference proceedings. The collection and analysis of gray literature as components of a rigorous systematic review or meta-analysis are required, therefore, to reduce publication bias and push back against it. Gray literature's impact in reducing publication bias is an area of debate. Gray literature has been shown, however, to play an important role in the dissemination

Developing a well-thought-out strategy for searching gray literature is commonly regarded as a best practice in evidence-based nursing

342

of negative or neutral findings. Its addition to a systematic review or meta-analysis has been determined to reduce estimates of treatment or intervention effects by about 12 percent.<sup>18</sup> It also helps to produce a more precise reckoning of effect size, the difference between the control group and one or more treatment groups.<sup>19</sup> Not all studies agree to what extent publication bias skews the likelihood of publication for empirical research. Nevertheless, developing a 23.2.

well-thought-out strategy for searching gray literature is commonly regarded as a best practice in evidence-based nursing.<sup>20</sup>

# **Filling Information Gaps**

In addition to reducing publication bias, gray literature can shorten the time between research and practice.<sup>21</sup> If published research is unavailable due to location, population, or date of publication, gray literature might provide the information. Reviewing such literature helps identify gaps in research so that they can be assessed.<sup>22</sup> When gaps in knowledge exist, nurses and other health professionals turn to gray literature to improve care.

Health professionals studying or working with "hard to find" populations, such as refugee and asylum seekers, undocumented immigrants, or the homeless, rely on gray literature for a substantial amount of their research. This gray literature is frequently government and national statistical data from resettlement and administrative records and is seldom indexed in databases.<sup>23</sup> In a similar vein, practicing evidence-based nursing in developing countries can be challenging due to lack of or limited access to resources. Nations in Africa have developed several models to promote and maintain the growth of these resources in libraries and provide access to them across the World Wide Web.<sup>24</sup> Research in African countries has produced little empirical evidence on which nurses and midwives in these countries can base their practice. A review of research in Africa found significantly higher instances of patient satisfaction and experiences in gray literature than in indexed studies, highlighting gray literature's potential as a rich source of information.<sup>25</sup>

While the sharing and dissemination of gray literature from around the globe has garnered much support, it is important to understand the distinction between information that is culturally acceptable to disseminate and information that is culturally protected.

Much gray literature exists in the realm of Indigenous knowledge, the "understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings [where] local knowledge informs decision-making about fundamental aspects of day-to-day life."<sup>26</sup> Such knowledge and learning seldom appear in resources indexed in databases, where most publications rely on research with a Western worldview rather than traditional or Indigenous ways of knowing.<sup>27</sup> Instead, Indigenous knowledge may reside in "student theses, project statements from nonprofit partners [and] social media accounts,"<sup>28</sup> oral histories, and studied cultural practices. Institutions such as the Library of Congress and proponents of copyright protection in places such as Africa and Canada support and respect sacred aspects of Indigenous health knowledge and culture. While some gray literature materials may not be available for public consumption, they may exist in designated spaces such as copyright-protected repositories or the Indigenous Law Portal, which provides a collection of primary source materials relating to Indigenous peoples of North and Central America.<sup>29</sup>

Evidence-based nursing can bridge knowledge systems, maintaining the integrity of Indigenous knowledge presented in gray literature (public or protected) and en-

abling the reciprocal exchange of learning.<sup>30</sup> This cross-cultural understanding has the potential to develop stronger cultural competence and communication in nursing and to create holistic, non-Western policies, protocols, and standards of care. For example, the National Collaborating Centre for Aboriginal Health in Canada applies "indigenous-informed evidence to transform practice, policy, and program decision-making

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across all sectors of public health.<sup>4</sup> The use of such nontraditional evidence resulted in updated public policies based on evidence-based research and the creation of a variety of gray literature resources, including reports and fact sheets.<sup>31</sup>

# Accessing Recent Clinical Research

Clinical trials influence evidence-based nursing, and their findings can impact standards of practice. Unpublished clinical research is a type of gray literature. Such reports can be found in a variety of venues, including patent databases, company or industry repositories, regulatory agency archives, meeting and congress websites, industry reports and press releases, and institutional or personal websites. ClinicalTrials.gov offers a registry and database of results of publicly and privately supported clinical studies.<sup>32</sup> Information from ongoing trials may provide insight into both positive and negative results, the inclusion of which can reduce publication bias. Also, because the time between study completion and publication may exceed two years,<sup>33</sup> the use of unpublished trials may ensure that the latest findings are included in evidence-based research. The influence of storytelling on health policy creation can also be tracked through gray literature.<sup>34</sup>

2<sup>3.2.</sup>

# Gray Literature's Impact on Nursing Research and Education

Although a well-established need for rigorous reviews keeps evidence-based nursing at the forefront of nursing interventions, surprisingly little has been written about collecting and analyzing gray literature within the field. Gray literature impacts nursing research beyond the systematic review and meta-analysis, extending into such areas as public health, health policy, and consumer health. This broad effect on evidence-based nursing supports the importance of gray literature instruction within nursing education.

2<sup>3</sup>.2.

Historically, the chief barrier to searching for and synthesizing the vast and complex set of resources available in gray literature is the idea that doing so is difficult and best left to information professionals. Reinforcing this concept are the common issues faced by researchers everywhere, including search methods, searching efficiency, replicability of searches, data management, data extraction, assessing study quality, data synthesis, time, and differentiating evidence synthesis from primary research.<sup>35</sup> Further compounding the challenges are the various types of gray literature and the process of identifying those most frequently used in nursing research. At a minimum, information professionals should insist on a strong, consistent gray literature component within an evidence-based nursing curriculum. Not all researchers will have equal access to experts, and not every library or librarian is capable of or willing to take on systematic review or to gather and analyze gray literature. For these reasons, an understanding of gray literature is a vital skill for all involved in evidence-based nursing, not just librarians.

Systematic reviews have increasingly become mandatory in many graduate nursing curricula.<sup>36</sup> Given that gray literature is a required aspect of a systematic review, gray literature instruction is often included in the graduate nursing curriculum. Kelly Penz and Sandra Bassendowski argue that "clinical registered nurses require continuing education opportunities to enhance their inquiry, research and appraisal skills... to review and analyze the evidence ... relevant to their clinical practice area."<sup>37</sup> Collaboration between nurse educators and librarians is required to embed gray literature instruction within the curriculum and discuss its specific roles within scholarly communication.

# Types of Gray Literature Important to Nursing

One challenge faced by those seeking and assessing grey literature is that there are close to 100 types of gray literature to cover.<sup>38</sup> Given that the use of each individual type is profession-specific, it is important to identify which are of highest value to nurses. Among its varying uses, citation analysis has been a key component of collection development strategies and has been employed to study student resource use across disciplines. Citation analysis can also help focus instruction on the types of gray literature most relevant to a profession such as nursing. Two citation analyses by Stephen Woods, Kathleen Phillips, and Andrew Dudash studied top nursing journals to assess the main types of gray literature cited in 2011 and 2018 (see Table 1). The analyses listed the main types of such literature as government documents, corporate organizations, conference proceedings, higher education, theses and dissertations, and news. Each of the six types of gray literature plays a significant role in evidence-based nursing research.

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Table 1.							
Gray literature citations r	er journal	in 2011 an	d 2018, by	type			
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Journal	Conterence proceeding	Government	News report	Corporate organization	Theses and dissertations	Higher education	Total
				2011			
Infection Control & Hospital Epidemiology*	96	325	11	88	2	4	576
Maternal and Child Health Journal	13	765	œ	235	11	43	1,075
Patient Education and Counseling	43	398	22	258	27	73	821
Journal of Women's Health	62	599	020	212	0	19	915
Journal of Clinical Nursing	76	725	12	505	103	129	1,555
Journal of Advanced Nursing	52	546	32 0	256	78	94	1,058
Scandinavian Journal of Caring Sciences	13	234	9	155	78	53	539
Percentage of total citations per type of gray literature, 2011	5.42%	55.70%	1.77%	26.14%	4.62%	6.35%	6,539
Infection Control & Hospital Epidemiology*	n/a	n/a	n/a	n/a	n/a	n/a	
Maternal and Child Health Journal	34	655	20	213	4	29	955
Patient Education and Counseling	78	343	10	320	14	47	812
Journal of Women's Health	43	577	11	203	5	26	862
Journal of Clinical Nursing	78	1,182	63	825	1280	123	2,399
Journal of Advanced Nursing	45	500	48	470	72	80	1,195
Scandinavian Journal of Caring Sciences	19	198	Э	102	44	6 ×	375
Percentage of total citations per type of gray literature, 2018	4.50%	52.36%	2.35%	32.33%	4.00%	%9 <u>7</u> %	6,598

Kathleen Phillips, Stephen Woods, and Andrew Dudash

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	Total		576	2,030	1,633	1,777	3,954	2,273	914	13,157		
	Higher education		4	72	120	45	252	174	62	5.54%		*2123.2.
	Theses and dissertations		5	15	41	Ŋ	231	150	122	4.30%		hication, por
	Corporate organization	Totals	88	448	578	415	1,330	726	257	29.20%		eqted for pulo
	News report		11	28	32	31	80	80	6	2.06%	3.00	
	Government		375	1,420	741	1,176	1,907	1,046	432	53.94%		
	Conference proceeding	, e	96	47	121	105	154	97	32	4.96%		
this most paper	Journal		Infection Control & Hospital Epidemiology*	Maternal and Child Health Journal	Patient Education and Counseling	Journal of Women's Health	Journal of Clinical Nursing	Journal of Advanced Nursing	Scandinavian Journal of Caring Sciences	Percentage of total citations per type of gray literature	*Data only available for 2011.	

Overall, Woods and his team found that gray literature accounted for approximately 10.4 percent of all citations. Government documents and corporate organizations comprised about 84 percent of such citations, while higher education, conference proceedings, theses and dissertations, and news made up the remaining 16 percent.<sup>39</sup> Comparing citation frequency between 2011 and 2018, the use of all types of gray literature increased except for government documents and conference proceedings (see Table 2). In interpreting these data, it is important to consider how the volume of production varies between each type of gray literature. News and government documents are produced at a much faster rate and higher volume than are such resources as conference proceedings or theses and dissertations. jon'

#### **Conference Proceedings**

While conference proceedings have decreased over the last few years, they are still important in the overall landscape of nursing publications. Such reports, including poster presentations, a subset of conference proceedings, have the potential to enhance the dissemination of nursing research and literature. Nicholas Rowe's study mapping citations of poster presentations found prominent use of this format by medicine and health-care disciplines. Nursing was ranked among the top five contributing disciplines for conference poster citations (n = 1,986) from 2010 to 2014, and trends suggest that posters will continue to grow as a medium of scholarly communication.<sup>40</sup> Conference proceedings bolster evidence-based nursing research in sharing early findings, identifying investigators, and fostering communication among nursing researchers. The American Association of Colleges of Nursing (AACN) expects nursing professionals to "present research findings at ... conferences and healthcare meetings," and Sharon Dudley-Brown maintains that posters, along with presentations and papers, are one of the three main methods for disseminating evidence.<sup>41</sup> Phil Halligan in 2008 and Michele Farrington in 2018 both conclude that poster presentations expand nursing knowledge and encourage changes in practice in a space where professionals appraise knowledge together.<sup>42</sup>

The precipitous drop in the use of conference proceedings over time in the data sets of Woods and his coauthors contradicts the Halligan and Farrington studies, leading to several questions. Have conference proceedings become harder to find? Are paywalls or broader access issues the reason for the drop? Some conferences have well-established avenues for publication, while others change more frequently. These questions and observations provide some basis for instruction and classroom discussion while emphasizing conference proceedings as an important type of gray literature used in evidence-based nursing research.

## **Government Documents**

Despite a slight decrease in government documents between 2011 and 2018, these publications remain the most cited of the gray literature types (53 percent). The ubiquitous nature of government information offers a familiar type of resource that is integral to evidence-based nursing. Government information includes statistics and data, agency reports, guidelines, and other fundamental resources related to health care, such as patient care, nurse advocacy, and health policy. The importance of these resources was 2<sup>3.2.</sup>

# Table 2.Change in citation frequency of types of gray literature from2011 to 2018

2011 to 2018				
	2011	2018	Percentage change	ortalize
Conference proceeding	358	294	-21.77%	,
Government	3,556	3,541	-0.42%	
News report	115	156	26.28%	
Corporate organizations	1,686	2,156	21.80%	
Theses and dissertations	276	290	4.83%	
Higher education	316	413	23.49%	_

exemplified in the American Academy of Nurse Practitioners 2011 study by Tobie Olsan, Carolanne Bianchi, Pamela White, Theresa Glessner, and Pamela Mapstone. It addressed the need for and use of government information in evidence-based health care policy. The authors declared it critical to seek information outside indexed databases to "retrieve the unindexed gray literature, which includes government documents, agency reports, fact sheets, standards, and statistics."<sup>43</sup> Evidence-based nursing research, whether national or international, will likely use government information to inform and enhance their results.

# Theses and Dissertations

Theses and dissertations are produced at a much lower rate than are other types of gray literature, such as materials from the news, corporate organizations, or higher education. In a 2005 study, Pat Sulouff, *Suzanne Bell, Judi Briden, Stephanie Frontz, and Ann Marshall* found conference proceedings (labeled conference presentations and papers) and theses and dissertations to be of utmost importance to over half of the population, including faculty and graduate students in psychology, biology, and business.<sup>44</sup> All these fields overlap with nursing in some capacity. Evidence-based nursing benefits from theses and dissertations due to their specific nature and their inclusion of substantially more information than a traditional empirical research publication. Authored and reviewed by experts within nursing, these gray literature resources add profession-specific value to evidence-based nursing research.

# **Higher Education**

With an average increase of 23.68 percent between 2011 and 2018, the gray literature types of higher education, corporate organizations, and news necessitate a greater understanding of how and why these materials are used in nursing publications and

their value for instruction. Higher education resources include repositories that hold data, working papers, content created by research centers, and preprints. This type of

gray literature provides a robust collection of resources to complement publicly or scholastically disseminated information. Preprints have become increasingly popular in the health sciences, with a sizable uptick in their use during the COVID-19 pandemic, as they provide faster access to needed research or information. Preprints, however, pose potential risks, such as weak or unsubstantiated findings and confusion with peer-reviewed work.<sup>45</sup> The benefits

The benefits and risks of preprints support the need for gray literature instruction, helping learners become discerning users of the information they encounter.

and risks of preprints support the need for gray literature instruction, helping learners become discerning users of the information they encounter.

#### **Corporate Organizations**

News

The corporate organizations category of gray literature includes materials from professional associations. Both corporate organizations, such as pharmaceutical companies, and professional groups, like the American Nurses Association and the Canadian Nurses Association, are frequent sources of support in evidence-based nursing. Corporate organizations produce valuable resources such as data sets and have the potential to strengthen evidence-based nursing research in such areas as societal behavior or human health. But locating them can be tricky, as not all corporate organizations share their data sets publicly. Even when they are willing to share, the information can remain elusive.<sup>46</sup> At the heart of evidence-based nursing, data set use has influenced hospital procedural change and is recommended by the International Council of Nurses (ICN) within their Core Competencies in Disaster Nursing.<sup>47</sup> Professional organizations, for example, produce advocacy-related documents and codes of ethics, as well as data sets.<sup>48</sup> Professional nursing associations provide not only resources focused on health issues but also materials dealing with the nursing profession.<sup>49</sup> For example, the ICN's COVID-19 update discusses nurses/mental health during the early stages of the pandemic.<sup>50</sup> Developing an understanding of the types of information produced by organizations and how to find it is another argument supporting gray literature instruction for evidence-based nursing.

The final identified gray literature category, news, has proliferated with online access, news feeds, and news source databases. The timely nature of news, as well as the growth of misinformation and disinformation, warrants time spent on instruction about this type of gray literature, with a focus on understanding how users search for, access, and evaluate these resources. News can offer a variety of viewpoints, providing a longitudinal review of an issue or topic. Platforms, such as blogs, blur the lines between scholarly research and expert insight. News as a gray literature source may be used differently than the previous five types of gray literature because it can play an integral role in the dissemination of evidence-based findings, as well as information that may run counter to

general standards of care.<sup>51</sup> News sources, in turn, can play an evidence-based role in conversations between providers and patients as consumer-focused gray literature resources.

These six types of gray literature sources related to nursing research provide the foundation for instruction on gray literature and its role in evidence-based nursing. The known struggles in identifying and understanding gray literature can be lessened in Kal23.2. teaching, thus producing stronger evidence-based nursing researchers and practitioners.

# Conclusion

This analysis was born of a desire to establish that gray literature instruction is a neces sary component of an evidence-based nursing curriculum. Because of the increasing prevalence of evidence-based research and practice, education focusing on gray literature is a requirement for nurses and other health professionals. Evidence-based research is not limited to systematic reviews or meta-analysis, nor is gray literature.

One fascinating aspect of gray literature is that it begets more gray literature. The more it is used and accepted, the more it will be created and disseminated. Gray literature not only interacts with evidence-based research when conducting a systematic review or meta-analysis but also serves vital functions in other aspects of evidence-based nursing research. Such sources play a crucial role in research focused on vulnerable populations, research using statistical data, and policy creation and nursing advocacy. Nurses, researchers, and educators may not have the help of an information professional in the gray literature retrieval and review process, so these are logical skills to add to a nursing student's repertoire. Gray literature's complex nature, with varying types and locations of resources, argues for incorporating it into nursing instruction. This should be emphasized in library reference and instruction outreach efforts with nursing programs. An article providing detailed advice about how to do so will appear in the next issue of portal: Libraries and the Academy, volume 23, number 2.

While this paper focuses on gray literature within evidence-based nursing, the theory embracing its inclusion in information literacy instruction is applicable across any discipline that incorporates or uses gray literature. Citation analysis provides evidence of how a profession utilizes gray literature in research and practice. This evidence-based approach to identifying gray literature types can be applied across disciplinary contexts. In general, gray literature instruction has the potential to grow student and faculty knowledge bases, enabling them to become stronger researchers capable of locating, analyzing, and absorbing this subset of resources into their work, enhancing scholarly conversations. This teaching will provide them with the necessary skills to see what nobody has seen, and, in turn, think what nobody has thought.

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