Project Information Literacy: What Can Be Learned about the Information-Seeking Behavior of Today's College Students?

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Project Information Literacy (PIL) has conducted six studies since 2008 to investigate what it is like to be a college student in the digital age. Survey and interview data has been collected from more than 11,000 US college students to investigate how they find, evaluate, and use information for their course work and for addressing issues that arise in their everyday lives. This paper highlights findings from these studies. In particular, the students surveyed have reported having more difficulty with defining and narrowing research topics than with conducting searches for materials, and they use the same small set of information resources when conducting course-related and everyday life research. Taken together, findings from the six studies suggest these students use strategies driven by efficiency and predictability in order to manage and control the vast amount of information that is available to them. PIL's typology is reviewed about the four information contexts undergraduates seek during their research processes.

Introduction

Project Information Literacy (PIL) is a series of national studies that investigates what it is like to be a college student in the digital age. We seek to understand how college students find information and conduct research—their needs, strategies, and workarounds—for their course work and for addressing issues that arise in their everyday lives.

Since 2008, more than 11,000 students from 57 colleges and universities across the US have been surveyed or interviewed, making PIL the largest study of information literacy ever conducted. This paper summarizes PIL's research, highlighting major findings from six studies and PIL's typology of the undergraduate research processes.

Purpose

Developmental psychologists have long identified the early 20s as a crucial time for learning and applying problem-solving skills.[1] In theory, the college experience rapidly advances students' cognitive development. Students are often asked about differences in viewpoint, what aspects of a topic may remain unexplored, and how a piece of knowledge or an issue may serve as a call for individual action later in life.

Undergraduates' information competencies are put to the test in the vast information landscape of their college years these days. They must carry out information tasks that are of special relevance to our research. They must perform and juggle tasks for courses, work, and in their personal lives, while making the

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transition from high school to college and from college to the workplace.[2] These tasks may be at least as complex as those undertaken by adults who have fully adjusted to life at large after graduation.

At the same time, more students in the US today are attending college than ever before—an upward trend that is expected to continue.* An unprecedented number of these students were *born digital*—meaning that digital technologies have been a constant feature in their lives. For them, information literacy competencies are always being formed, practiced, and learned. Finding and using information is exponentially more complex than it was a generation ago as the information landscape has shifted from one of scarcity of resources to abundance and overload.

These combinations of factors make today's college students an important and unique cohort to study. Few studies have explored what finding, using, and creating information means to students, while giving insights into how high school information practices may transfer to college and how college information practices may subsequently transfer to the workplace. Even fewer studies by library and information scientists have systematically investigated how students who were born digital acquire their information literacy competencies and how they use, adapt, and expand upon these strategies for learning in school, at work, in their everyday lives, and as lifelong learners.

Literature Review

Information literacy is defined as the competencies an individual summons in order to locate, retrieve, evaluate, select, and use information sources.[3] The term *information literacy* first appeared in workplace discourse during the 1970s, indicative of the paradigmatic shift from the industrial to the digital age. In 1974, the president of the Information Industry Association called for an "information literate workforce" skilled at applying information resources.[4] Fifteen years later, in 1989, when information literacy became an essential element of the academic library's mission, competencies were codified into tangible, specific learning outcomes.[5]

In its Presidential Committee Final Report, the Association of College and Research Libraries (ACRL) defined information literacy as a set of standards and abilities for both recognizing when information is needed and having the skills to find, evaluate, and apply that information.[6] In 2000, ACRL updated its standards in response to pressing issues about the complexity of the information retrieval environment.[7] These critical skills are the basis of lifelong learning, so students can "master content and extend their investigations, become more self-directed, and assume greater control over their own learning."[8]

Academic and school librarians have devoted tremendous effort and resources to teaching students how to navigate increasingly complex information systems. Their goal is to train students to be information literate. Educational committees, made up of librarians and faculty, in higher education and K-12, have codified information literacy standards for formalized information literacy tests.[9] Some standardized-information literacy tests have been designed.[10] Numerous books and studies have been devoted to information literacy instruction and lifelong learning.[11] There are also several seminal models for teaching the information problem-solving process.[12]

Despite this extensive collection of publications, the information literacy literature is not without its limitations and critics. Scholars have noted a lack of consensus about how best to assess information literacy competencies is a shortcoming of the field.[13] Other researchers have claimed that information literacy's singular confinement to the educational community constitutes a significant knowledge gap.[14]

In the ongoing research at PIL, we have identified another critical gap in the library literature: while information literacy standards underscore the importance of training information literate and critical thinkers, very little is actually known about how college students put their information literacy competencies into practice in their words and through the lens of their own experience.

Methods

PIL's research is grounded in information-seeking behavior research—how students conduct research and find information using which channels.[15] Social science methods are used to study how college students

* In the 2011–2012 academic year, 833,000 graduates received an associate degree and 1,725,000 received a bachelor's degree from a US college or university—up 60% from only a decade before. Source: The US Department of Education. Accessed February 11, 2013, http://nces.ed.gov/fastfacts/display.asp?id=372.

TABLE 1
PIL Research Reports, 2009-2012

Report Title	Year	Authors	Methods	Sample Size
1. *Finding Context: What Today's College Students Say about Conducting Research in the Digital Age*[16]	2009	Head & Eisenberg	Focus groups	86 students; 7 US campuses
2. *Lessons Learned: How College Students Seek Information in the Digital Age*[17]	2009	Head & Eisenberg	Online survey	2,318 students,; 6 US campuses
3. *Assigning Inquiry: How Handouts for Research Assignments Guide Today's Students*[18]	2010	Head & Eisenberg	Content analysis	191 handouts from faculty on 28 US campuses
4. *Truth Be Told: How College Students Evaluate and Use Information in the Digital Age*[19]	2010	Head & Eisenberg	Online survey	8,353 students, 25 US campuses
5. *Balancing Act: How College Students Manage Technology while in the Library during Crunch Time*[20]	2011	Head & Eisenberg	Interviews	560 student interviews, 10 US campuses
6. *Learning Curve: How College Graduates Solve Information Problems Once They Join the Workplace*[21]	2012	Head	Interviews and focus groups	23 US employers interviewed; total of 33 graduates in 5 focus groups on 4 US campuses

conceptualize and operationalize course-related and everyday life research.

PIL defines *course-related research* in broad terms—from the moment students receive a research assignment in a college course, through collecting materials, until turning in the final assignment to an instructor. *Everyday life research* is defined as the research that students conduct for personal reasons and for use in their daily lives.

Both of these research processes are investigated through students' accounts, reports, experiences, and processes. Table 1 provides details about the research studies conducted, as of 2012.

Nearly 200 community colleges and four-year colleges in the US are in PIL's Volunteer Sample.[22] Study samples are drawn from this source and composed of self-selected volunteers from a larger population of students.

The demographics of our samples have reflected the demographics of the student population from the campuses that participated in our studies in terms of gender, majors, and grade point averages. While our studies use a representative sample, we acknowledge that the population of students at these universities may not necessarily be representative and suitable for making inferences about all students in institutions of higher education.

Major Findings from the Six Studies

PIL has found that the large majority of students surveyed still attend college to learn, but most are soon lost in a thicket of information overload. They struggle with managing the information technology (IT) devices that permeate their lives. Nearly all students we have studied intentionally use a small compass for navigating the ever-widening and complex information landscape they inhabit.

No matter where they are enrolled and no matter what they are studying, most students adopt a strategic approach to their information-seeking research. Students use strategies driven by efficiency and predictability in order to manage and control a staggering amount of information that is available to them in college settings. Moreover, they consciously manage their research tasks and activities within the constraints of the research process (e.g., time, availability of resources, and expectations).

Key findings from PIL studies are as follows:

1. Eighty percent—eight in ten of the students PIL surveyed in 2010—reported having overwhelming difficulties with getting started on research assignments and determining the nature and scope of what their instructors required of them.[23]

2. Half of the students PIL surveyed in 2010 reported nagging uncertainties with concluding and assessing the quality of their research efforts. Students struggled with the same frustrating open-endedness when trying to find information and conduct research for college courses (25%) and to a lesser extent, for solving an information problem in their personal lives (21%).[24]
3. Almost all of the college students PIL has surveyed in 2010 have reported using a risk-averse and consistent strategy and relied on the same few "tried and true" resources, such as course readings, Google, library databases, and Wikipedia, to control the vast amount information.[25]
4. For course-related research sources, a large majority of students PIL surveyed in our 2010 study reported turning to course readings (96%), search engines (92%), scholarly research databases (e.g., JSTOR or ABI Inform) (88%), and instructors (83%).[26]
5. For everyday life research, most students PIL surveyed in our 2010 study relied on search engines (95%), friends (87%), Wikipedia (84%), and their personal collection (75%).[27]
6. Ninety percent of students PIL surveyed in 2010 turned to libraries for certain online scholarly research databases (such as those provided by EBSCO, JSTOR, or ProQuest) for conducting course-related research. They reported valuing the resources for credible content (78%), in-depth information (76%), and the ability to meet instructors' expectations (74%).[28]
7. Across all PIL surveys, students tremendously underutilize librarians. Eight out of ten of the respondents (80%) in PIL's 2009 survey reported rarely, if ever, turning to librarians for help with defining topics or searching for sources when working on course-related research assignments.[29]
8. Even though it was often librarians who initially taught students how to use online scholarly research databases (e.g., during freshmen training sessions), students in follow-up interviews in a 2009 study reported turning to their instructors for research assistance and coaching, as they advanced through their college years.[30]
9. Evaluating information was often a collaborative process—nearly half of the students (49%) PIL surveyed in 2010 frequently asked instructors for assistance with assessing the quality of sources for course work—far fewer asked librarians (11%) for assistance.[31]
10. Almost two-thirds of the students (61%) PIL surveyed in 2010 reported that they consulted friends and/or family members when they needed help and advice sorting through and evaluating information for personal use.[32]
11. The majority of students PIL surveyed in 2010 used routines for completing one research assignment to the next, including writing a thesis statement (58%), adding personal perspective to papers (55%), and developing a working outline (51%). Many techniques were learned in high school and ported to college, according to students in followup interviews.[33]
12. Despite the seismic changes in the way that information is now created and delivered, 83% of instructors' handouts for research assignments PIL analyzed in 2010 called for the standard research paper. Few handouts asked students to present findings using other formats, including multimedia and oral presentations.[34]
13. Sixty percent—six in ten—of the research handouts PIL analyzed in 2010 recommended that students go to the library shelves—a *place-based source*—more than to scholarly research databases, the library catalog, the Web, or, for that matter, any other resource.
14. Only 13% of the handouts PIL analyzed in 2010 suggested consulting a librarian for assistance with research.[35]
15. During crunch time in the library, most of the students (85%) that PIL interviewed in 2011 could be classified as "light" technology users.[36] These were students who used "only" one or two IT devices primarily in support of coursework and, to a lesser extent, communication. The most frequent combination (40%) of devices being used was a cell phone (including smart phones) with a personally owned laptop computer while they were in the library.[37] In stark contrast, only 8% of the sample could be classified as "heavy" technology users.[38]

16. Despite the pressing need to complete assignments at crunch time at the end of the semester, few of the students PIL interviewed in 2011 reported having used the full range of library resources and/or services during the previous hour. Many more respondents said they had used library equipment (39%) such as computers and printers than anything else, including scholarly research databases (11%), library books (9%), face-to-face reference (5%), and/or online reference (2%).[39]
17. Most of the recent graduates who participated in PIL's 2012 focus groups reported they leveraged competencies from college for evaluating and managing published content once they graduated and entered the workplace and were conducting workplace research. These skills, however, only got them so far, and most graduates still needed to develop social skills for conducting iterative research with team members in their new workplace settings.[40]
18. A large majority of the US employers that PIL interviewed in 2012 found that the students were technology-savvy, but these employers were dismayed to find that most of these college hires were tethered to their computers and rarely went beyond a Google search and the first page of results looking for "the" answer to a workplace problem.[41]

Taken together, these and other findings of PIL have profound implications for teaching, learning, work, and play in the 21st century. They lead us to conclude the abundance of information technology devices and the proliferation of digital information resources have made conducting research paradoxical: information may be as limitless as the universe, yet defining and narrowing inquiries and finding relevant and accurate answers is one of the most difficult and frustrating challenges college students face today. Furthermore, based on the flood of comments and reactions to these findings from educators, administrators, professionals in various fields, and laypersons, it appears that the "information-seeking paradox" affects almost everyone.

Discussion

Until Project Information Literacy, few studies have investigated why today's college students have difficulties with conducting course-related and everyday life research in the digital age.

One exception is the Ethnographic Research in Illinois Academic Libraries (ERIAL) Project. At five US colleges and universities, a team of anthropologists and librarians used ethnographic methods to study a sample of 650 students conducting over 700 different research activities between 2008 and 2010.[42]

ERIAL researchers found their sample of students struggled with all aspects of the search process; most were prone to use Google first for course-related research, instead of the constellation of library resources.[43] Moreover, students lacked knowledge about how search engines worked and results were returned, keeping them from applying sound search logic for conducting "good research."

PIL's research substantiates ERIAL's findings: Many students have difficulty understanding what the search process entails; many default to using Google and a few other familiar sources. However, where PIL has explored new territory is with their typology about finding context—searching for meaning that facilitates interpretation so that results may be had.[44] We argue that finding context is one of the most laborious, yet requisite, parts of the research process for today's students.

As an outgrowth of PIL's research, we have defined a working typology of four research contexts undergraduates seek during their research processes,

TABLE 2
Finding Context

Context	Information Need	Course Research	Everyday Life
Big Picture	Summary, background, overview	Almost always	Often
Information Gathering	Finding and securing relevant sources	Often	Sometimes
Language	Meaning of words, terms	Sometimes	Sometimes
Situational	Surrounding circumstances, how far to go with search	Sometimes	Sometimes

whether they are searching for information for course work or personal use. Contexts are defined for finding: (1) big picture context or background about a topic, (2) relevant information sources from all the sources that may be available, (3) the meaning of language, and (3) situational factors, including another person's (i.e., instructor's) expectations. Table 2 provides an overview of students' search for context and when these needs occur.[45]

PIL's research studies have verified that students' effort for finding context often start at the beginning of their research process and the following tenets:

1. Students usually need to obtain several different kinds of context, especially the big picture and information gathering contexts, for their course-related and to a lesser extent everyday life research.
2. Students look for different kinds of context and invest different degrees of effort and energy, depending on whether the research was academic or everyday life research and what interest the topic held for them.
3. Students have developed strategies, techniques, and workarounds adapted from what they learned during high school and through trial and error methods that sometimes, but not always, help them find context.

Further, we found nearly all of the students PIL has surveyed have reported using the same few information sources, regardless of which research contexts they were trying to satisfy and regardless of whether they were conducting course-related or everyday life research.[46] Figure 1 and Figure 2 present comparative charts that show what resources students frequently

FIGURE 1
Course-Related Research Sources

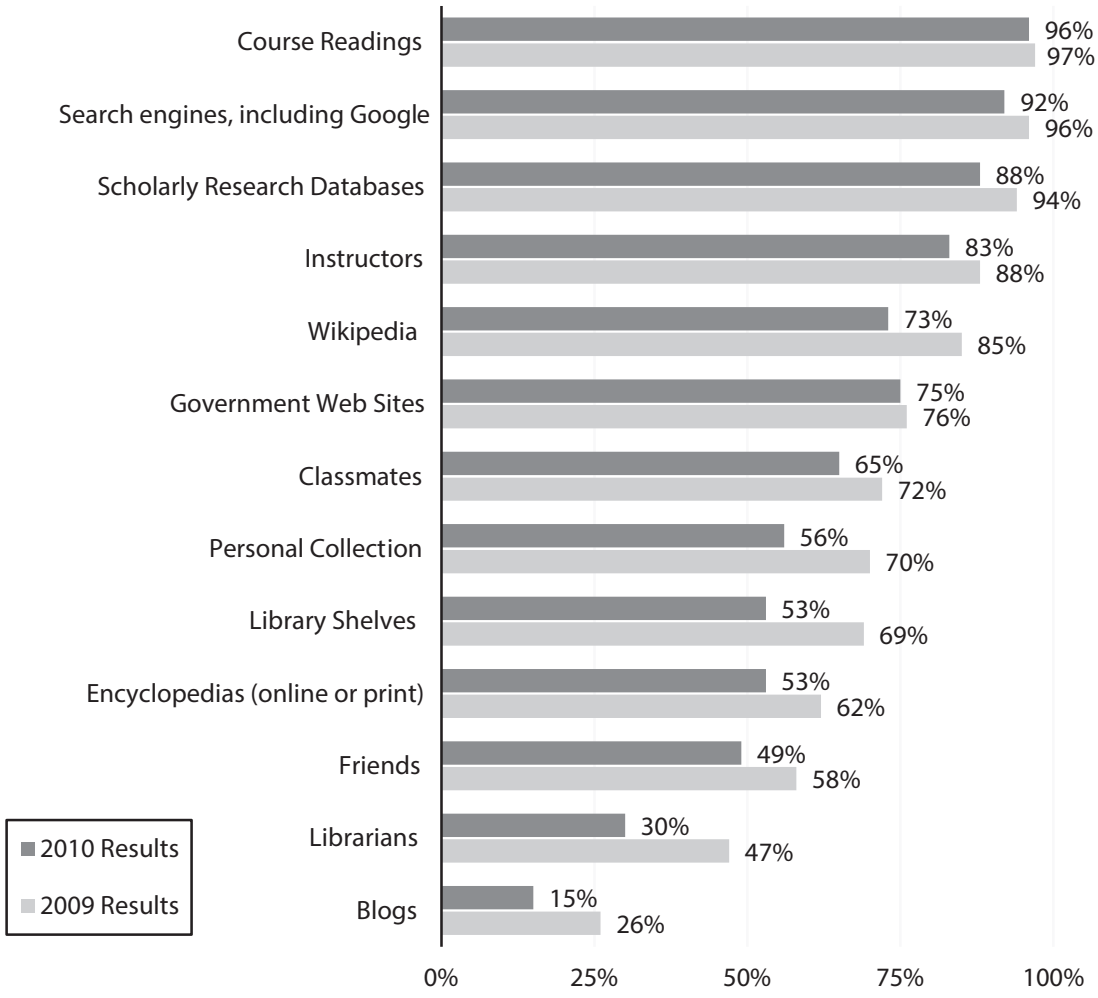
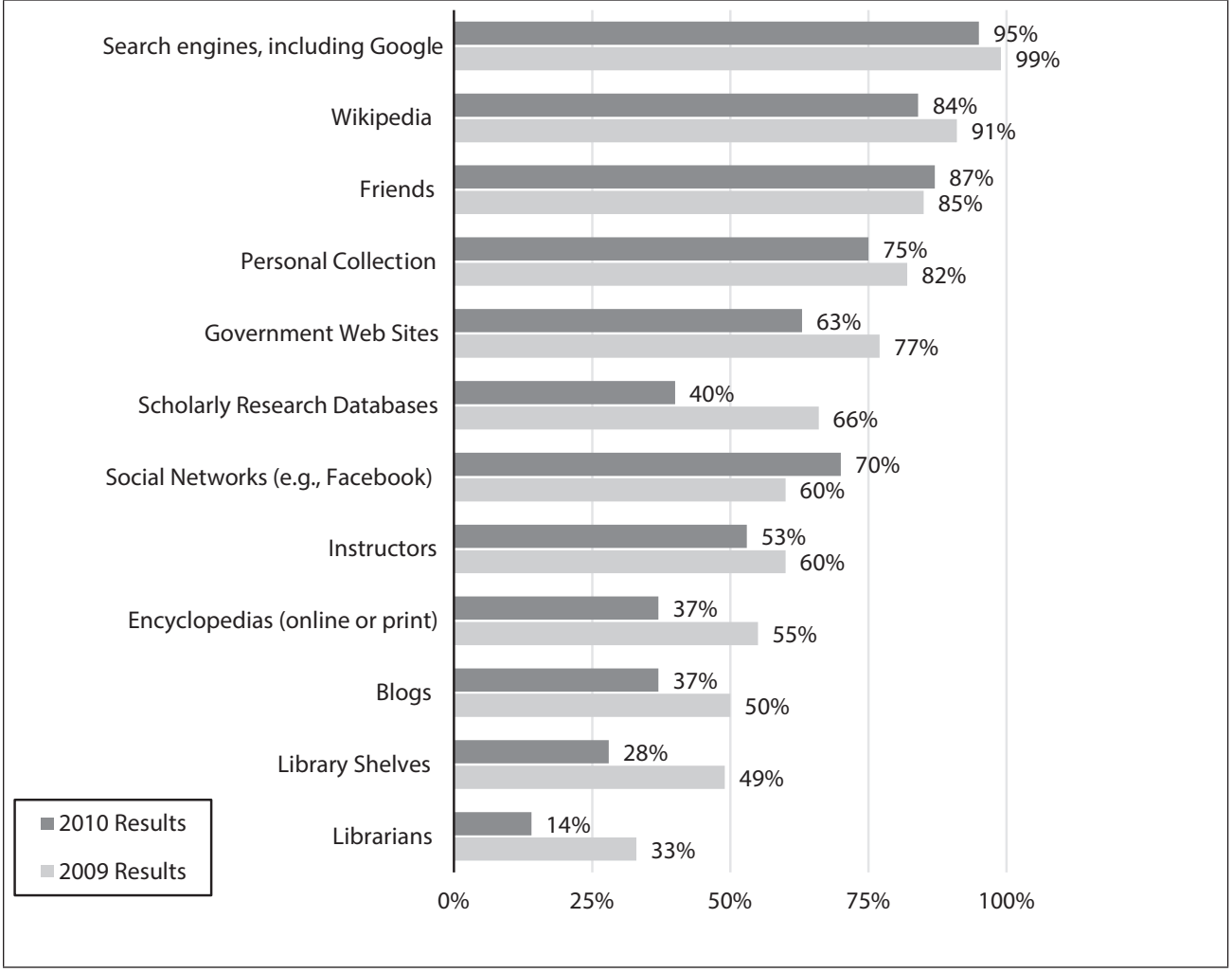


FIGURE 2
Everyday Life Research Sources



reported using for course work and for personal use, based on our 2009 and 2010 surveys.

These results indicate that Google was a go-to search tool for almost all of the students in the samples.[47] However, students conducting course-related research started with course readings, more than Google and more than any other resource.[48] At the same time, nearly all of the students in both the 2009 and 2010 surveys used scholarly research databases to satisfy all four of their needs for certain contexts.[49] In both surveys, few respondents consulted librarians—either for course-related or everyday life research.[50]

Findings regarding choice and use of sources from the two comparative surveys are noteworthy: they indicate students in the 2010 survey sample used the same set of information resources for course-related research in the same order of frequency, as did students in the 2009 survey sample. In other words, most of the students we have surveyed relied on the same few sources of information and turned to the same sources first, second, third, and so forth to fulfill course-related research assignments, regardless of the vast amount of information that their college campuses make available to them.

Results from both surveys confirm students have consistent practices for resource prioritization. Further, they suggest a large majority of students use a hybrid approach to conducting research and finding information. That is, most students balance their high-tech use of secondary sources with their high-touch need for information through one-on-one exchanges with instructors, friends, classmates, and to a lesser extent, librarians.

Conclusion

This paper highlights findings from the research PIL has conducted since 2008. The findings from these large-scale studies contribute to an understanding of how today's college students find and use information and provide insights for librarians and educators into three ways:

1. How students (in their own words) put their information literacy competencies into practice in learning environments in a digital age, regardless of how they may measure up to standards for being information literate.
2. How students recognize the information needs they may have and in turn, how they locate, evaluate, select and use the information that is needed, given the proliferation of online resources and new technologies that make up today's campus information landscape.
3. How teaching the critical and information literacy skills that are needed to enable lifelong learning may be more effectively conveyed to college students.

PIL's ongoing research focuses on studying information competencies through the lens of the student experience. Data are collected on a large-scale from multiple and diverse campuses across the US. This approach has identified interesting and often unexpected gaps in terms of student behaviors and understandings, skills and knowledge, and differences in expectations, perceptions, needs, and approaches between students and librarians and teaching faculty. These gaps highlight opportunities for improving students' learning, development, and achievement through information literacy instruction.

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