JOURNAL OF NEW LIBRARIANSHIP
Vol. 9, No. 2, 2024
https://doi.org/10.33011/newlibs/17/1

Peer-Reviewed Article

The Myth of the 'Born Digital:' Addressing Student Computer and Digital Literacy

Carmen Cole, *Penn State University*
Emily Mross, *Penn State University, Harrisburg*
Andrea Pritt, *Penn State University, Harrisburg*

ABSTRACT

We may incorrectly assume that because many of our students were "born digital," and have never known a time without computers in their schools or classrooms, they are innately digitally literate. However, interactions with students at all levels in a variety of settings such as introductory undergraduate courses, graduate seminars, and technology-focused workshops have demonstrated that some students struggle with or are unaware of basic computing and digital literacy concepts like file management and information organization. This article details three unique case studies and explores how librarians liaising with different subject areas have worked to incorporate digital literacy objectives into their instruction and outreach initiatives. Inclusive learning opportunities for librarians and instructors to enhance students' digital literacy skills are recommended.

KEYWORDS

computing literacy, digital literacy, instruction, digital myth

SUGGESTED CITATION

Cole, C.; Mross, E.; & Pritt, A. (2024). The myth of the 'born digital:' Addressing student computer and digital literacy. *Journal of New Librarianship, 9* (2), 1-. https://doi.org/10.33011/newlibs/17/1.

Introduction

Twenty-first century academic librarians may assume that most of the students we see in our classrooms come to college with well-developed or even innate technology skills. The average, traditional-age incoming first-year student has perhaps never known a time without computers in both their school and their home so, surely, they have the knowledge to perform everyday digital literacy tasks. According to the Marist College Mindset List, the students who will graduate from college in 2026 were typically born in 2004, the same year as Facebook, and those who will graduate in 2027 share their 2005 birth year with YouTube; these students have never known life without computers and social media (Marist College, 2022; Marist College, 2023).

However, buying into the assumption that because students have always coexisted with technology that they are experts in its use can cause frustrations for both teachers and students if the myth of the "born digital" student to continues to permeate through our instructional spaces. The Pennsylvania State University (Penn State) serves nearly 88,000 students in a wide variety of academic disciplines, ranging from undergraduate to doctoral degree programs (Penn State University, 2023), and their level of digital skills can widely vary. In conducting library instruction, we have experienced this digital literacy knowledge gap among both undergraduate and graduate students in many subject areas. In this article, we explore how our often-incorrect individual assumptions about student computer and digital literacy necessitated creating practical solutions to avoid the impact of these incorrect assumptions in the future when developing instruction and outreach initiatives.

Literature Review

The computing and digital literacy skills of college students have become a topic of increasing concern in academia. An article in *The Verge* titled, "File Not Found," sparked discussions among educators about the proficiency of their students in computing and digital literacy (Min, 2021). Specifically, the article shared insights from science, technology, engineering, and math (STEM) professors who observed a lack of computing competency among their students, particularly in basic file management. Students often struggled to locate files and frequently relied on search functions instead of navigating file directories. Additionally, the article illuminated various strategies employed by professors to address these challenges in basic computing and digital literacy. One notable example was the professor that had discovered that some students compared viewing the items on their computers as a disorganized pile of laundry and using search functions as "directing a robot" to find specific items in that pile. In response, they developed a comprehensive tutorial video explaining computer setup basics. An additional overarching issue highlighted was the disconnect between educators and students in terms of terminology and concepts related to computing. This disconnect led to instances where students were unsure of where they had saved their projects or how to access specific directories.

To understand the context further, one may examine the concepts of "digital natives" and "digital immigrants." Prensky (2001) introduced these terms, defining digital natives as individuals born into the digital age (beginning in 1980), while digital immigrants as those who adopted technology later in life. These concepts help shed some light on the diverse technological backgrounds of today's students; however, this framework has faced criticism for its oversimplification and problematic implications. Haiyang (2020) noted that the term "digital native" may not be suitable in all cultural contexts, and the term "immigrant" is used disparagingly by Prensky in the article. For instance, Prensky (2001) suggested that digital immigrants "speak with an accent" when using technology, implying that they are less proficient or capable than digital natives. As an alternative to the term “digital native,” Haiyang (2020) proposed the use of the terms "digitizen” or “born digital.” We have chosen to use the term "born digital" to describe students who have grown up in the digital age. It is worth considering, however, that the term “born digital” refers in many contexts to the creation of digital materials rather than to people born after a certain time. Using this term to refer to people could lead to confusion, depending on the audience. Other possible alternatives for people born after 1980 include "digital first" or "digital exclusive," which convey similar meanings but may still pose some ambiguity. Educators should consider their context and audience to select the best term to describe these students.

Terminology for people is not the only muddy point. The concept of digital literacy or competency lacks a universally agreed-upon definition despite its increasing importance in the 21st century. Osterman (2012) described digital literacy as, "...cognitive-thinking strategies that consumers of digital information utilize" (p. 135). Different universities have adopted their own definitions, ranging from using technology to complete information literacy skills to a broader ability to perform tasks effectively in digital environments (Walton, 2016). However, the ever-evolving nature of technology makes it challenging to create specific guidelines for digital literacy (Haight, 2020). Technological change and unequal exposure to technology make it challenging to pinpoint the exact skills students need when entering higher education (McLeod & Torres, 2020). It is important to note that just because students use technology does not necessarily mean they understand it or possess transferable digital literacy skills (Coldwell-Nielson, 2017).

Personal Information Management (PIM) is a critical aspect of digital literacy. Robinson and Johnson (2012) identified four key activities in PIM: gathering, organizing, re-finding, and maintenance. The core principle of PIM is ensuring that individuals consistently possess accurate, relevant information, conveniently accessible in suitable formats, and of high enough quality to fulfill their immediate requirements (John & Bruce, 2005). For example, a student may successfully gather resources for an assignment; however, they may not organize the resources in a distinct, easily findable location (such as in a citation manager library or personal computer folder). As the student begins assembling their resources for the assignment, they may not be able to conveniently locate the relevant information if it is spread across web-based

organizational tools, a variety of personal computer locations and devices, and bookmarked web pages. John and Bruce (2005) noted that despite the abundance of tools and technologies for personal information management, the diversity of those tools contributes to the problem of information fragmentation, as individuals often maintain multiple, similar yet inconsistent organizational schemes across various mediums.

Robinson and Johnson (2012) additionally emphasized the highly personal nature of PIM, with everyone organizing their information uniquely. This complexity becomes apparent when, as noted above, students need to synthesize fragmented knowledge for their coursework, as information is scattered across different platforms and devices. PIM's relevance to learning has been emphasized as an essential skill for students as it aids in managing various information sources. Jaffe et al. (2009) and Kocak (2021) noted that PIM is not merely about practical actions but involves constructive cognitive processes such as naming files, grouping, categorizing, and classifying, skills that necessitate digital literacy. Understanding PIM is crucial for educators and students alike, as its importance to digital literacy impacts the overall learning process.

Libraries play a pivotal role in fostering digital literacy and emphasizing the importance of PIM as a part of the research process. Many may see libraries as spaces for storing books, but students and researchers generally fulfill their knowledge needs by accessing digital media (Antonijević & Cahoy, 2014). Libraries have expanded their mission in addressing connectivity, online education, and digital literacy development, especially in the post-COVID-19 era (Martzoukou, 2020). In response to the challenges outlined in *The Verge* article, some libraries have created instructional videos to teach digital skills (Breen, Waters, & O'Shea, 2022). Librarians have become facilitators and collaborators in enhancing digital literacy across campus (Hallman, Thomas, & Beach, 2018).

It is also important to note that the Association of College and Research Libraries (ACRL) Framework for Information Literacy (2016) assumes a certain level of digital literacy. However, it is essential for librarians to question what skills students should possess before engaging with the Framework fully. Information literacy, traditionally focused on research skills, needs to evolve to encompass digital literacy more comprehensively (Osterman, 2012). The ability to organize and store information is a complex task, and students may require instruction in computer and tool literacy to effectively manage their information (Otopah & Dadzie, 2013). The ability to organize information meaningfully is a knowledge practice within the "Research as Inquiry" frame, if students already possess this skill (ACRL, 2016). Students may benefit from the integration of PIM into information literacy instruction to ensure they understand what to do with found information (Stewart & Basic, 2014).

The Verge article, "File Not Found," may serve as a starting point for discussions about the computing and digital literacy skills of college students (Chin, 2021). As technology continues to evolve, the complexity of digital literacy, the significance of PIM, and the role

libraries play in addressing these challenges are important facets for educators to understand as they adapt to meet the diverse needs of students. Libraries and educators have a role to play in supporting the development of digital skills and bridging the digital divide (Martzoukou, 2020). The "ownership" of digital literacy development within the higher education environment may not always be clearly defined (Alon, Forkosh-Baruch, & Nachmias, 2020). However, libraries have the potential to take a leading role in delivering this content.

Librarian Case Studies

In this section, we detail our experiences in working with a subject area either as part of course-related instruction or extra-curricular workshops related to digital literacy skills. The case studies detail the student groups involved, the digital literacy issues noticed, and the steps taken or proposed to improve student digital literacy for the future.

Code for Her

Code for Her was a nine-week series of basic web programming workshops targeted to women and gender nonconforming individuals at the Penn State University, University Park campus. The leaders of Code for Her held the workshops over two years (2018-2020), with each academic semester comprising two twenty-five-person cohort sections: one section for students, and one for faculty and staff. All participants learned the basics of HTML, CSS, and JavaScript, programming languages generally used for website content creation. The workshop assumed no prior knowledge of web programming experience on the part of participants.

Once the leaders chose the workshop participants from an application pool, they would send an introductory email instructing participants on how to download Microsoft Visual Studio, the programming environment used for Code for Her. When the workshops first started, the leaders provided participants with brief instructions on how to download the program (for both Macs and PCs). However, it was discovered in the first sessions that some participants did not understand how to complete the process, mostly due to "not knowing where the download file went" on their machines. Additionally, there was often confusion with how to open and install the program once the file was downloaded. For example, the leaders instructed participants to unzip the downloaded file, find the install file, and begin the installation process. The workshop leaders quickly realized that rather than instructing participants to install the program before the start of the sessions, participants would feel more comfortable and empowered to walk through the process as a cohort. Questions and collaboration with cohort members was highly encouraged, and the leaders ensured that all terminology was clearly explained (such as "unzip the file"). Further, the workshop leaders demonstrated how to pin the program to the task bar or dock of their desktops and suggested that placing the program on their desktop may be a good place for easy access.

Before a particular workshop started, participants were instructed to retrieve a package of files from the workshop GitHub site. Again, the leaders encountered the, "I don't know how to

do this; I don't know where the files went" problem and had to take a step back to demonstrate these skills. The workshop leaders created a "file path" activity for participants. For each session, knowing where their files were in their directory was essential to opening files downloaded from GitHub, and in creating some elements of a program and then getting that program to run. File path navigation is something that people are usually not often trained to do, so clear instructions and examples were needed. In completing the file path activity, participants also had the chance to work with their cohort members to practice the skills. Participants became more comfortable with creating clear file paths and adopting consistent naming conventions for their files.

It was important to recognize and acknowledge the assumptions workshop leaders had of their participants in the early days of hosting the sessions. Another assumption workshop leaders held was that participants in the student cohorts would be more proficient in basic computing skills simply by being "born digital." However, although the student participants used technology daily to complete school tasks, as noted in *The Verge* article, they lacked some basic computing competencies (Chin, 2021). Overall, both participant groups became more confident in their skills, could navigate more easily, understood file paths, and file organization. Encouragement and a supportive learning environment made for more enthusiasm and ease in learning these skills.

Digital Badging

Many Penn State courses offer the opportunity for students to build research skills through digital badges. These digital badges break down the research process into simpler steps and completing these badges requires a certain level of digital literacy and digital skills that we may wrongly assume students already possess.

As badge reviewers, librarians evaluate student evidence from undergraduates to determine if they mastered the skills required for each badge via an online platform. Students completing badges were generally enrolled in introductory-level courses from a variety of subject areas that included basic academic research as part of the syllabus. Courses utilizing the badging platform often have significant enrollment numbers or are offered through Penn State's World Campus. These caveats can make it challenging to incorporate in-person library instruction, though the student achievement of the learning objectives of each course can benefit from including basic library research instruction.

When reviewing evidence, incorrect assumptions about digital literacy often came to light. For example, in many badges, students are required to upload a screenshot of search results from a library database to the badging platform. The nature of the badging platform and badge assignments assume that students know how to take and upload screenshots, and therefore, the process is not explained. However, when reviewing badge evidence, it was

apparent that students might benefit from an explanation of common ways to take and share a screenshot on PC, Mac, and mobile devices.

Instead of sharing screenshots, students often uploaded pictures taken with a cellphone of their computer screen. This adds several steps to the workflow for both the student completing the badge and the librarian reviewing the evidence. In these cases, the student must take a picture of their computer screen with a mobile device, then email the file or otherwise upload the photo to their computer, and finally share the photo as an attachment to their badge evidence. The librarian reviewer must download the photo and open it in a photo viewing software. Screenshots, on the other hand, can be pasted into and then seamlessly viewed via the badging platform, which saves time for both parties.

Adding an explanation of digital skills necessary to complete each badge may be useful for students who are building digital literacy along with their information literacy as they complete the badge. The Penn State University Libraries are investigating a new badging solution, as the original platform has sunset. In future iterations, there is a benefit to incorporating even smaller skills into micro credentialing to help meet student needs. Iterating instructions and even assignments themselves based on evidence and experience during assessment might improve student digital literacy and save time for all participants.

Research Data Management Workshops

Research Data Management (RDM) focuses on processes that make data organized, accessible, and reusable; librarians support researchers in implementing these processes (ALA, 2018). Students and faculty engaging in grant-funded research are often required by their funders to submit RDM plans as part of the grant requirements though incorporating RDM practices should be standard for all researchers.

At Penn State Harrisburg, the Data and Collections Coordinator developed and offered RDM workshops geared primarily toward STEM graduate students and faculty, with the goal of enhancing their research data management practices and data literacy. Broadly, data literacy is defined as the ability to read, create, and communicate with data to share as information (Martin, 2014). The workshops were initially developed with the assumption that graduate students and faculty researchers would have advanced knowledge of RDM, but after the first RDM workshop, it was clear that these assumptions were incorrect.

The workshop participants lacked useful file organization skills. Very few students had clear naming conventions for their own data, there was no defined folder structure to manage their data, and only one student understood the meaning of version control or managing changes to data sets over time. Students said they located their data files during research projects by using the search feature on their computer to find the file they want – just as described in *The Verge* article, “File Not Found” (Chin, 2021). Participants also did not have standard naming conventions for their research files, and many did not understand why this was

an important RDM process. While others recognized why a clear naming convention was important, they said they did not think of implementing the process when saving their work. This literacy gap was also noticed by a member of the STEM faculty, who was alarmed because important files could be lost if not saved in the right place, with the right name.

Another RDM workshop focused on data transformation, which is the process of converting data from one format or structure to another. Data wrangling – gathering, selecting, and manipulating data to answer specific analytical questions - often involves data transformation. A researcher knows their data better than a librarian does, and the researcher should know what will make their data valuable and reusable in the future. To facilitate reuse, a researcher may want to change their data in some way, perhaps by filtering it, merging it, or even deleting it. An assumed quick and easy example of data transformation deployed in the workshop involved changing research data from an Excel Workbook, or .xlsx file, to a Comma-separated Values file, or. csv file, so the data can be imported into software such as R or Python. The librarian assumed all students would already know these steps:

1. Open a file in Excel!
2. Select File
3. Select Save As
4. Change the file type to .csv
5. Save the file to a location on their computer!
6. Open the newly created .csv file in a different program.

However, several students did not know how to do this, nor did they understand why they might need to.

The goal of each RDM workshop is to increase student researchers' data literacy, a component of digital literacy. An indicator of data literacy is the ability of the researcher to document and describe their data. The librarian assumed participants would know how to do this to make it reusable later. Each workshop included discussions about documenting data at the study or project level, including research design and data collection methods, which should be reported in a research paper, as well as documentation at the data level, including descriptions of their variables or code and interview transcript codes. But student responses indicated they had not thought about documentation in a process-oriented manner, such as: "Yeah, I know this information but it's all in my head," or "I have this information, but it's written down on different sheets of paper." While this might be satisfactory for small projects or brainstorming, it is less than ideal for large projects or data that the student may want to revisit or reuse later, let alone those they plan to publish in the future. A few students said they were not practicing these behaviors because "No one will want to use my data anyway." Responses like this led to incorporation of broader data conversations with graduate students in later workshops which have been helpful in getting participants to see and understand the larger context of their own research data and digital literacy skills. This also presented an opportunity

for incorporation of the ACRL Framework (2016) regarding the student's role as a researcher with important contributions to the scholarly conversations.

The assumptions that framed the first workshops stemmed from the librarian's personal experiences and familiarity with the topic from recent undergraduate and graduate schoolwork, all based in the United States. A fair number of the participants have a different background; they are international students who were not always exposed to research libraries or digital literacy practices related to academic research in their home countries. Additionally, some of the graduate students did not participate in significant academic research during their undergraduate studies or are returning to academia after several years away from higher education and did not often have opportunities to use these skills at their current full-time jobs. Following these experiences, the RDM workshops included more scaffolding of digital literacy skills to meet the needs of the students.

Inclusive Digital Literacy Development Opportunities

Do not assume digital skills

First, we encourage readers to not assume competency with digital literacy skills. As demonstrated in the above case studies, our assumptions often fell short. Librarians should consider the previous experiences of students. Where are they from? What resources have they had access to? Do they have access to these resources now? For the RDM workshops, we now always ask up front what they think "research data management" means before transitioning to teaching the organizational and retrieval skills.

Edit instructions to include competencies and software requirements

We recommend that instructors and librarians add a list of digital skills and software knowledge competencies that will be required for the course/lesson and provide a list of resources that may help students build these skills if necessary. At the Penn State Universities Libraries, this assistance may include direct links to LinkedIn Learning, books from the library, materials from the Safari Learning Platform: Academic Edition database accessible via the library, or any relevant external resources.

Give more detailed instructions

We also suggest that when librarians are instructing students to perform a task, that they demonstrate and provide clear instructions on how to do so. This will avoid confusion and frustration experienced by both the students and the librarian. We have found that tasks we consider simple or basic are not always simple or basic for our students. We've all experienced reading poorly outlined instructions in our pasts. Frankel and Smith (2022) underscore the importance of providing clear and specific instructions, well-organized courses and lessons with defined expectations, and accessibility to supplementary learning resources.

Conclusion

The assumption that twenty-first-century college students possess innate digital literacy skills due to their upbringing in a technology-driven world can lead to misunderstandings and challenges in educational settings. These assumptions can be misleading, as even those born in the digital age may not possess expected computer and digital literacy competencies. Further, diversity in age, geographic upbringing, and socio-economic status in each class make it impossible to view students as a born-digital monolith. It is crucial also that we do not view technological ubiquity as indicative of digital fluency.

Given the role many academic libraries play in providing access to technology and teaching information literacy skills, they should be recognized as key players in fostering digital literacy. We encourage librarians to embrace a growing role in addressing digital divides when providing instructional content. Focus on backwards design when developing library instruction, coupled with basic audits of the technical skills and tools required to proficiently complete lesson-related tasks can help address these issues. It is important to acknowledge, however, that the ownership of digital skills development within universities may not always be clear-cut, and that collaboration with others outside of the library, specifically in disciplinary departments, may be necessary. We should not expect that librarians address every aspect of technological and digital literacy. Collaboration and communication are key: the authors found common ground and shared methods for addressing student skill gaps when we discovered that our students shared many of the same areas of concern. Discussing digital literacy as they relate to subject areas could help improve instruction on the library and the curriculum sides of the issue.

Our case studies demonstrate the importance of not assuming digital competencies among students. These experiences emphasize the necessity of clear and detailed instructions, as well as the incorporation of digital skills and software requirements into course materials. The challenges and complexities of digital literacy underscore the need for educators and librarians to be proactive in addressing digital skills gaps among students. By adopting inclusive and informative approaches, we can better support students in developing the necessary digital literacy skills for success in their academic and professional endeavors.

References

American Library Association. (2018, April 17). *Keeping up with research data management*. http://www.ala.org/acrl/publications/keeping_up_with/rdm

Association of College & Research Libraries. (2016.) Framework for information literacy in higher education. https://www.ala.org/acrl/standards/ilframework

Alon, L., Forkosh-Baruch, A., & Nachmias, R. (2020, June). Gaps in personal information management behavior of higher education students: implications for a training program. In *EdMedia+ Innovate Learning* (pp. 352-358). Association for the Advancement of Computing in Education (AACE). Retrieved from https://www.learntechlib.org/p/217321/

Antonijević, S., & Cahoy, E. S. (2014). Personal library curation: An ethnographic study of scholars' information practices. *portal: Libraries and the Academy*, *14*(2), 287-306. https://doi.org/10.1353/pla.2014.0010

Breen, M., Waters, J., & O'Shea, L. (2022). Taking a Lead on Digital Literacy for Students—A Case Study from the Library at the University of Limerick. *New Review of Academic Librarianship*, 1-22. https://doi.org/10.1080/13614533.2022.2039243

Chin, M. (2021, September 22). *File Not Found*. The Verge. https://www.theverge.com/22684730/students-file-folder-directory-structure-education-gen-z

Coldwell-Neilson, J. (2017, January). Assumed digital literacy knowledge by Australian universities: Are students informed? In *Proceedings of the Nineteenth Australasian Computing Education Conference* (pp. 75-80). https://doi.org/10.1145/3013499.3013505

Frankel, R., & Smith, K. F. (2022). Leveling the playing field inside the classroom. *Journal of First-generation Student Success*, *2*(2), 118-125. https://doi.org/10.1080/26906015.2022.2070443

Haight, I.M. (2020). Digital natives, techno-transplants: Framing minimum technology standards for law school graduates. *Journal of the Legal Profession, 175*(2020), 175-222. https://dx.doi.org/10.2139/ssrn.3547669

Haiyang, S. (2020). Who are information and technology talents?: A literature review. *Human Behavior & Emerging Technologies, 2020*(2), 299-297. https://doi.org/10.1002/hbe2.206

Hallam, G., Thomas, A., & Beach, B. (2018). Creating a connected future through information and digital literacy: Strategic directions at the University of Queensland Library. *Journal*

of the Australian Library and Information Association, *67*(1), 42-54. https://doi.org/10.1080/24750158.2018.1426365

Hardof-Jaffe, S., Hershkovitz, A., Abu-Kishk, H., Bergman, O., & Nachmias, R. (2009). Students' organization strategies of personal information space. *Journal of Digital Information*, *10*(5). https://journals.tdl.org/jodi/index.php/jodi/article/view/438

Jones, W., & Bruce, H. (2005, January). A report on the NSF-sponsored workshop on personal information management, Seattle, WA, 2005. In *Personal Information Management 2005: A Special Workshop Sponsored by the National Science Foundation* (pp. 1-47). https://pim.ischool.washington.edu/final%20PIM%20report.pdf

Kocak, O. (2021). Development and validation of a scale for assessing personal digital content management skills of higher education students. *Malaysian Journal of Library & Information Science*, *26*(2), 69–87.

http://jice.um.edu.my/index.php/MJLIS/article/view/25158

Marist College. (2022). *The 2022 Marist Mindset List for the class of 2026*. https://www.marist.edu/mindset-list/2026

Marist College. (2023). *The 2023 Marist Mindset List for the class of 2027*. https://www.marist.edu/mindset-list/2027

Martin, E. R. (2014). What is data literacy? *Journal of eScience Librarianship*, *3*(1), 1-2. https://doi.org/10.7191/jeslib.2014.1069

Martzoukou, K. (2020). Academic libraries in COVID-19: A renewed mission for digital literacy. *Library Management, 42*(4/5), 266-276. https://doi.org/10.1108/LM-09-2020-0131

McLeod, A., & Torres, L. (2020, April). Enhancing first year university students' digital skills with the Digital Skill Development (DSD) framework. In *Society for Information Technology & Teacher Education International Conference* (pp. 373-379). Association for the Advancement of Computing in Education (AACE). Retrieved from https://www.learntechlib.org/p/216019/

Osterman, M.D. (2012). Digital literacy: Definition, theoretical framework, and competencies. In M.S. Plakhotnik, S.M. Nielson, & D.M. Pane (Eds.), *Proceedings of the 11th Annual College of Education & GSN Research Conference*. (pp.135-141). Miami: Florida International University. Retrieved from https://digitalcommons.fiu.edu/cgi/viewcontent.cgi?article=1213&context=sferc

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), 1-6. https://doi.org/10.1108/10748120110424816

Otopah, F.O., & Dadzie, P. (2013). Personal information management practices of students and its implications for library services. *Aslib Proceedings: New Information Perspectives*, *65*(2), 143–160. https://doi.org/10.1108/00012531311313970

Penn State University. (2023). *Student Enrollment, Fall 2023*. https://datadigest.psu.edu/student-enrollment/

Robinson, S., & Johnson, F. (2012). The process and affective environment of students' personal information management. *Enhancing Learning in the Social Sciences*, *4*(2), 1–13. https://doi.org/10.11120/elss.2012.04020005

Stewart, K. N., & Basic, J. (2014). Information encountering and management in information literacy instruction of undergraduate students. *International Journal of Information Management*, *34*(2), 74–79. https://doi.org/10.1016/j.ijinfomgt.2013.10.007

Walton, G. (2016). "Digital literacy" (DL): Establishing the boundaries and identifying the partners. *New Review of Academic Librarianship*, *22*(1), 1-4. https://doi.org/10.1080/13614533.2015.1137466