Developing Lesson Plans for Teaching Spatial Data Management in Academic Libraries through a Lens of Popular Culture

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Abstract

Understanding data management in spatial data science is fundamentally important when ensuring a project's data is appropriately collected, analyzed, stored, and communicated. However, these concepts are often introduced to learners through compliance (i.e., we do this because we are required to or it is the right thing to do), and as a result can mean learning experiences around spatial data management are viewed less than enthusiastically. Academic libraries are places where engaging learning experiences around spatial data management can be explored and implemented through unique pedagogical techniques. For example, activities teaching spatial data management in academic libraries through a popular culture lens can make these topics more approachable and reduce learning barriers. In this paper, I present three lesson plans for academic librarians which approach teaching spatial data management through popular culture. The following concepts are represented: (1) understanding spatial metadata through Dungeons & Dragons; (2) learning to write good documentation through drawing Pokémon; and (3) developing good file naming habits with 1980s album covers. Alongside the lesson plans, I provide a narrative outlining why popular culture pedagogy is a useful technique to spatial data management education to increase the inclusivity and engagement around geospatial learning experiences in academic libraries.

Keywords

Spatial data management; GIS data management; popular culture; pedagogy; lesson plans

Introduction

How does an educator support enthusiasm for learning experiences around something that is normally framed through compliance? This is a question perplexing many librarians whose role

includes education around research data management (RDM). This may consist of a set of activities and strategies supporting the proper organization, description, documentation, storage, and sharing of data (if applicable) throughout a project lifecycle (the definition here inspired by those posed by Whyte and Tedds (2011), Cox and Pinfield (2014), and Briney, Coates, and Goben (2020). Academic libraries must promote and provide education on good data management practices to support a healthy research landscape on the campuses they serve. While research in any domain area and topic benefits from good data management practices, this paper's topic revolves around spatial data used in geographic information science (GIS) research. Spatial data is geographical information primarily concerning the relationships across time and space between "events, activities and things located on (or near) the surface of the earth" (Bishop and Grubesic 2016, 1), although spatial data can also include data from astronomical environments (Ansan et al. 2008) and even within the human body (Costello et al. 2009). Spatial data is generally represented in geographic coordinates (such as latitude and longitude) and topology, which describes how geographic features are arranged spatially and interconnected (Bishop and Grubesic 2016).

On college and university campuses, academic libraries represent prime locations for teaching GIS and geospatial concepts and skills. One of the reasons is that they are removed from the learner's home departments and represent an inclusive, intermediate space for learning fundamental concepts underlying more advanced data engagement. This is particularly true in spatial data management. Geospatial courses taught within academic departments often spend less time on data management fundamentals and more time on the analyses and technologies themselves, leaving a potential educational gap in developing solid geospatial skills. In academic libraries, data librarians, liaison librarians to geography departments, and GIS librarians (not an exhaustive list) may find themselves more heavily involved in spatial data management education for their campuses and thus are the target audiences for this paper.

Spatial data management is an important topic in which academic librarians can provide educational support. For example, the fundamental concepts themselves (such as file naming, data backups, documentation) are often seen as less engaging or less essential to the research process than data analysis and data visualization. This paper aims to introduce and contextualize three lesson plans for teaching spatial data management concepts in academic libraries through popular culture to increase engagement and enthusiasm around these topics. This paper offers an analysis of why academic librarians are well-suited to provide data management education to researchers, and how librarians can supplement education in GIS courses with spatial data management educational support. Next, the paper offers a literature review to demonstrate why pedagogy using popular culture is effective for transformative learning experiences. Finally, it describes the development and content of three lesson plans for teaching spatial data management concepts (metadata,

documentation, and file naming) through popular culture lenses (Dungeons & Dragons, Pokémon, and 1980s album covers, respectively). These lesson plans, which are freely available online and targeted for use by GIS and data librarians, support creating unique, engaging learning environments and enthusiasm around spatial data management.

These lesson plans, which offer a unique approach to data management instruction, are not meant to devalue more traditional forms of education around these concepts, such as DataONE's Data Management Skillbuilding Hub (DataONE 2020) and the ESIP Data Management Training Clearinghouse (Earth Science Information Partners 2020). Instead, they contribute to the current breadth of materials available to the librarian community around data management and offer another method for instruction techniques on these topics for varying audiences. While some audiences may more strongly connect to learning experiences provided by resources such as DataONE and ESIP which approach data management more straightforwardly, other audiences may better relate to learning data management through a popular culture analogy. Both forms of education techniques are valid and useful for supporting a stronger culture around data management research.

Spatial Data Management Education in Academic Libraries

The 2013 policy memorandum by the Office of Science and Technology Policy (OSTP), called "Increasing Access to the Results of Federally Funded Scientific Research" (OSTP 2013) directed United States federal agencies to expand public access to the results of taxpayer-funded research and accelerated the momentum for open data and data sharing in the scientific community within and beyond the country (Kriesberg et al. 2017). With this memorandum came an increased need for data management education for researchers, including preparing data for open/shared access and writing effective data management plans for grant applications. However, Strasser and Hampton (2012) found that these concepts in data management are often not taught in undergraduate courses. In a survey of ecology instructors at US institutions, the authors found that "barriers identified by instructors were primarily associated with a lack of time, but instructors also cited lack of resources, lack of knowledge, and their belief that data management is not an appropriate topic for the level of students they teach" (3). This could lead to a double-edged sword where students feel underprepared for dealing with growing demands for open data, data sharing, and data management, yet feel there is no space to seek this support and education in their home departments. These barriers can also mean that when some undergraduate students later become graduate students and eventually faculty or researchers in industry, they may have underdeveloped data management skills.

Although Strasser and Hampton's research is applied to an ecology setting, it is reasonable to also extend this conversation to GIS education. While it is true that many GIS courses taught within geography departments (or in other departments, such as anthropology, environmental science, etc.) may engage with data management concepts such as file structuring in a GI system and data storage, there may often be more of a pedagogical focus on the analysis techniques themselves, with data management concepts anecdotally mentioned but not always the focus of a lesson (for reference, University Consortium for Geographic Information Science (2013) offers a repository for course syllabi for geospatial education). As a person's career progresses, these gaps in data management education can amplify a need for data management skill development, especially if the person is applying to grants from federal funding agencies such as the National Science Foundation or National Endowment for the Humanities, two agencies that may fund geographical research. Therefore, researchers needing to learn robust skills in spatial data management to keep up with growing momentum around open data and data sharing may need to seek additional support to learn these concepts outside of departmental courses.

Academic libraries can fill this gap left by educational curricula that may focus more on analytical techniques than data management foundations. Eaker (2014) notes that "librarians... have taken the lead in developing training on the best practices needed to make research data generated in one project useful in another" (3) and ultimately supporting good data management practices aimed at more transparent, reproducible research. GIS and data librarians and liaison librarians to domain areas with researchers using spatial data, are in a prime position to offer engaging, helpful, and effective learning experiences around spatial data management. Because these topics are not typically seen as immediately applicable or exciting as data analysis and data visualization (and often viewed through a lens of compliance), it is essential to design learning experiences that are memorable and engaging. This research supports engaging spatial data management learning through lesson plans focused on teaching a data management concept through a popular culture lens.

The Power of Popular Culture in Education

Although in the literature it is difficult to find a widely agreed-upon definition of popular culture, Szeman and O'Brien (2017) offer a definition that strongly underpins this research: "popular culture consists of the traditional practices and beliefs or way of life of a specific group...popular culture is simply the practices of everyday life" (18). Koh and Benson (2011) assert that popular culture's value is more than just a consumptive activity for humans to enjoy, but also offers immense, alluring pedagogical value that educators should use more extensively as a bridge to enriching course material in learning environments. Popular culture encourages humans to look at the world in new ways and challenge prior knowledge and/or opinions about a topic (Jubas, Taber,

and Brown 2015), reiterating its pedagogical value in encouraging learners to approach familiar topics through a new lens, or unfamiliar topics with an air of curiosity. Further, Wright and Sandlin (2009) discuss the transformative learning experiences made possible through popular culture's ability to challenge preconceived notions about a topic, and although their analysis is applied to social justice issues, the same argument for transformative learning experiences using popular culture can be applied to data management. In this context, data management principles such as metadata, documentation, and file naming schemes can be reframed and understood through a lens of popular culture trends, facets, or themes to create an engaging learning experience.

While many researchers understand the need for data management education in a research ecosystem that increasingly values open data/data sharing and reproducibility, reframing preconceived notions about these learning experiences is important for building a culture that is enthusiastic about data management, rather than taking part simply for compliance. Lesson plans outlining instruction for common data management techniques and principles through a lens of popular culture can help support a lively learning environment around these topics. This can reduce barriers to learning and may help data professionals feel more comfortable teaching these materials. As Mayernik et al. (2014), Poole (2015), and Tenopir et al. (2016) note, a large number of data professionals have found themselves in the roles through circuitous paths, thus bringing varying levels of comfort and anxiety to teaching concepts such as data management.

The ideas, themes, and practices that constitute popular culture are fluid and dependent on geographical location, age, access, and a host of other sociocultural factors. Therefore, it is important to note that the lesson plans presented in this research reflect the author's own positionality to and consumption of popular culture. Those using the lesson plans are encouraged to consider alternative learning objectives, subjects, or themes based on the target audience or the instructor's knowledge of popular culture topics.

Lesson Plan Development

Each of the three lesson plans focuses on a specific spatial data management topic framed through a particular facet of popular culture. The spatial data management topics highlighted in the plans were chosen based on the foundational concepts taught most heavily in the author's library workshops on data management. The inclusion or exclusion of principles and techniques in the lesson plans do not signify a hierarchy of specific data management techniques over others. The three topics of focus are metadata, documentation, and file naming as applied to spatial research. The three popular culture lenses based on each topic are Dungeons & Dragons, Pokémon, and 1980s music album covers. Each lesson plan describes how to take learners through an activity designed around the aforementioned popular culture topics, connecting the activity to themes

and recommended spatial data management practices.

The lesson plans are designed for library workshops or for use within a course as an instructional session (whether as a visiting librarian or as the instructor of record). They are also suitable for any audience seeking educational support in an academic library, including students (undergraduate and graduate), staff and postdocs, and faculty. Price (2015) outlines a technique for building lesson plans aimed at library instruction, and the author's technique served as a guide for creating the format and content of the lesson plans for this project. Price's technique, applied in their research to a nursing classroom environment, included analyzing an existing assignment/activity to select appropriate learning objectives, identifying the crucial pieces of information needed in the lesson plan to achieve these objectives, and reviewing the lesson plan for efficacy in several theoretical classroom scenarios. The lesson plans in this paper were developed by applying Price's methodology to preexisting data management exercises facilitated at the author's own institution, and reviewed for effectiveness in many theoretical scenarios posited by Price (2015) such as having reduced time to complete the lesson, needing another librarian to cover the lesson due to illness, and being asked to repeat the same lesson to another course taught by the professor. Each plan offers advice for running the workshop both within in-person and virtual settings. The lesson plans are available on KiltHub, Carnegie Mellon University's comprehensive institutional repository, under a Creative Commons CC-BY 4.0 license which allows for free and widespread use with attribution to the author. Below is the discussion of the specifics of each individual lesson plan, and the context of their development and impact.

Lesson Plan 1: Teach Spatial Metadata through Dungeons & Dragons Adventure Locations

As Littman (2014) notes, "the fundamental conflict underlying the worlds of Dungeons & Dragons is that between good and evil" (p. 7). Dungeons & Dragons (hereafter D&D) is a role-playing game published in 1974 in which players are guided through fantasy worlds in an "adventure," which is a single story making up a larger campaign (a broader string of adventures, analogous to a season of a television show) and make a series of decisions as they navigate situations at the interplay between good and evil. Each adventure takes place in a fictional setting (called an "adventure location") with its own climate, architecture, geology, ecological features, and landmarks such as bridges, temples, and shrines (DnD Wiki 2020). Playing within these adventure locations in a D&D campaign encourages the players to consider how their presence moves through these imagined environments, and how these environments impact their decisions within the adventure. Although the game offers pre-generated adventure locations, players can use their creativity to design fictional settings through which their players will navigate.

Garcia (2020) asserts "the impact of D&D and the gaming genre that it created in broader popular culture cannot be underplayed" (13). Librarians have explored the value of role-playing games such as D&D in library environments (Snow 2008; Vose 2012) as avenues for helping patrons build skills in cooperation, conflict resolution, storytelling, and literacy. Leveraging the popular culture appeal of the game in an academic library instruction environment is a strategy for fostering unique learning experiences. D&D creates a space for players to design their own adventure locations in imagined settings, encouraging them to consider what themes, colors, sounds, smells, landmarks, and characteristics make up the locations. This opens up a unique learning opportunity to teach metadata concepts as they relate to data management.

Metadata is descriptive and contextual information applied to an object (in this case, data) that captures an object's complexity in a more straightforward form (Pomerantz 2015, 12). Metadata can include the data creator, time range of data collection, subject/categories represented within the data, and various other descriptive factors needed to better understand the data's context. In data management, metadata is essential for data sharing and reproducibility in that it helps data users understand how the data was developed, and how it should be properly used. The characteristics of a D&D adventure location (landmarks, topology, smells, sounds, colors, etc.) can be considered metadata that captures the important elements defining that location. Therefore, teaching learners how to build and describe a D&D adventure location can be a useful proxy for teaching foundational concepts in metadata, and more specifically, metadata for spatial research.

This lesson plan outlines how librarians can teach spatial metadata concepts by designing a D&D adventure location. The total time allotted to the instruction session is 60 minutes, and educators using the lesson plan should be prepared to provide a brief primer on D&D for learners who are not familiar with the game. After learners are primed on D&D, the lesson plan offers a step-by-step workflow for introducing the premise of adventure locations, and how an adventure location contains metadata describing the space's spatial nature. Next, the facilitator gives a short lecture on metadata as a concept (without tying it to data management) and how it is used to describe the world around us. Then, learners are split into groups and tasked with designing their adventure location, defining the metadata that captures spatial descriptions of the location (What is the topography? What is the climate? Does the setting mimic any real-life locations on Earth, and in what ways?). After each group completes their adventure location and list of metadata describing the location, a chosen representative from each group gives a 5 minute summary of their work. Finally, the facilitator ties these concepts to metadata for spatial data management through a brief lecture, encouraging learners to apply the same creativity they used in the exercise to their research data.

Lesson Plan 2: Teach Documentation for Spatial Research through Pokémon

The Pokémon media franchise encompasses video games, playing card games, manga, television shows, and toys (Panumate et al. 2015) and is managed by The Pokémon Company. The franchise revolves around a fictional world where humans become trainers for Pokémon, creatures who battle each other and gain new skills and power as they progress in their training, evolving into new physical forms as they grow. Trainers accumulate Pokémon as they navigate through this fictional world, creating a team of Pokémon who battle the team of other trainers and wild Pokémon. At the time of writing, there are over 900 distinct Pokémon, each having their own unique phenotypic appearance which widely varies, from fantasy-like features (such as Ho-Oh, who resembles a mythical phoenix) to anthropomorphic features (such as Machoke, who resembles a human wrestler/fighter). Each Pokémon has several unique defining characteristics, and players are encouraged to understand how those characteristics impact the Pokémon's battle style, home environment, and training needs. Pokémon also has a trading element, in which players can trade for the desired Pokémon with the physical characteristics they would like on their team. Therefore, understanding how to pinpoint and describe the unique physical attributes of a Pokémon is central to consuming the culture around Pokémon.

An essential aspect of data management is documentation of the research process and all the data involved, from the project's start to its end. Good documentation supports reusing data files and reproducing a research methodology with that data, particularly as these details can be forgotten over time (Briney, Coates, and Goben 2020). Documentation is important for all research, but incredibly crucial for research using complex sampling techniques (Blank and Rasmussen 2004) and variables that need additional context and description to understand. In the same manner that it is helpful to know how to describe a Pokémon's physical characteristics when choosing a Pokémon to battle or trade, understanding how to document a project properly is essential for creating organized, reproducible, and shareable research. In spatial research, documenting how data was collected/discovered, evaluated for suitability (or fitness for use, as defined by Bishop and Grubesic 2016), analyzed, and stored is important for supporting a healthy ecosystem of GIS and geography research. Regular documentation of spatial research can also ensure that the data user is operating within the data's legal and contractual bounds. This kind of research can use both open and proprietary data (such as from ESRI or other geospatial companies) which both have unique reuse guidelines. When providing data management education to researchers, academic librarians must train researchers on writing good documentation. Leveraging the unique characteristics of Pokémon is a beneficial way to teach good documentation practices that entail describing the intricacies of a research project and the data contained within.

This lesson plan provides a blueprint for librarians to teach proper documentation techniques for spatial research through describing and drawing Pokémon. Like the previous lesson plan, the total time allotted to the instruction session is 60 minutes. Educators using the lesson plan should be prepared to provide a brief primer on Pokémon for learners who are not familiar with the franchise. After the learners are primed on Pokémon, the facilitator can follow the step-by-step workflow for introducing the activity of describing and drawing Pokémon. First, the facilitator gives a short lecture on documentation as a concept (without tying it to data management) and how it is used to define and capture the steps we take to complete a specific action. Learners are then given a sheet of paper and a writing utensil (or, in virtual environments, are asked to open a text document) and choose a Pokémon from Bulbapedia, a comprehensive list of all the current Pokémon within the franchise. Once a Pokémon is selected, the learner writes down step-by-step instructions for how another person would draw the creature without explicitly naming the Pokémon. These instructions should capture the unique physical characteristics of the Pokémon. After each person completes their written instructions, they are asked to trade those instructions with another learner, and each person must try to draw the Pokémon based on the instructions they received. After learners attempt to draw the Pokémon, each person reveals which Pokémon their instructions described. Finally, the facilitator ties these concepts to documentation for spatial data management through a brief lecture, encouraging learners to apply the same creativity and detail they used in the exercise to their own documentation of their research, writing their documentation in a way that supports reproducibility of the research.

Lesson Plan 3: Teach File Naming for Spatial Research through 1980s Album Covers

The notion of the "cheesy 1980s album cover" is well-documented in popular culture media outlets such as Paste Magazine (2013) and Billboard (2015). The album covers from this decade, which often include unique fashion choices, awkward poses and image composition, and other fascinating stylistic elements, can evoke nostalgia. Cross (2015) describes nostalgia in modern popular culture for styles, fashion, and themes of the past. This nostalgia is often rooted in objects that evoke memories from lived experiences or evoke the "feel" of something from the past in lieu of a lived experience. Part of the allure in speaking about, sharing, and critiquing 1980s album covers is capturing all the elements that define each album cover's uniqueness, reflecting a certain nostalgia for the 1980s. A content analysis of these album covers would reveal categories of features, such as clothing, colors, props, and poses present in the images. These categories reflect how these album covers stand unique among each other both within and outside of this decade.

Much like 1980s album covers, spatial data contains defining elements which differentiate it from or categorize it with other spatial data in a GIS or geography research project. Understanding how to effectively capture these data elements is a key component of file naming, which involves

assigning names to (mostly) digital files. The process of file naming relates to individual files and concerns how those files relate to other files and hierarchies both within and outside of a research project or institution (Krewer and Wahl 2018). Researchers tend to name their files in drastically different ways, in a best-case scenario by identifying the elements that most strongly encapsulate their view of the content of the file, and in a worst-case scenario by not employing any file naming scheme and haphazardly naming files with little helpful context (such as file1, file2, file3, etc.). Logically organized and named files help researchers, and potentially collaborators and other users, to better navigate the data for future use. Spatial data management education should include advice for developing good habits in properly naming digital files and creating a descriptive file naming scheme. Leveraging the popular culture nostalgia appeal of 1980s album covers and defining their unique elements can serve as a useful proxy for better understanding recommending file naming habits.

This lesson plan guides librarians in teaching good file naming habits for spatial data research through 1980s album covers. As with the previous two lesson plans, the instruction session's total time is 60 minutes. Educators using the lesson plan should be prepared to provide a brief primer on 1980s music and the "Long Play" (LP) sound storage medium (a medium allowing audio to be played in a given player; in this case a phonograph). Because some learners may not have nostalgia for the 1980s (due to age, country of origin, etc.), the facilitator may need to explain why there is nostalgia for album covers from this decade in popular culture. After this primer, the lesson plan provides a workflow for learning good file naming habits through naming 1980s album covers as though they are digital image files. Next, the facilitator gives a short lecture on file naming as a concept (without tying it to data management) and how it is used to describe and organize files in research. The facilitator then gives learners several small rectangles of paper and a writing utensil (or, in virtual environments, learners are asked to open a text document) and starts a presentation with at least 10 unique album covers from 1980s musicians and bands. As individuals, learners write down how they would name each album cover as though it is an image file they are saving on their computer, writing down one file name per small sheet of paper. After the facilitator has shown all of the album covers, learners trade their pieces of paper (or digital text document) with a partner. Each person tries to match each file name to the specific album cover. Finally, the facilitator ties these concepts to file naming for spatial data management through a brief lecture, encouraging learners to ensure their file naming schemes capture the essential elements needed to identify the files within their research properly.

Conclusions and Futures

The need for data management education for researchers has never been so dire, and researchers in GIS and geography are no exception. Academic librarians have taken the lead in advancing data management education for researchers on their campuses. GIS and data librarians are often tasked with providing this support to scholars conducting GIS and geography research. This increases the need for openly available educational materials for use by the community to support this effort. In order to build a culture of enthusiasm, rather than simply compliance, around data management, creating unique, engaging learning experiences around this topic is incredibly important. Pedagogical techniques using popular culture can create an innovative learning experience that encourage learners to approach certain topics through a fresh lens, with a healthy curiosity and creativity. Accordingly, this paper has described the development of the three lesson plans, which outline how to teach the data management concepts of metadata, documentation, and file naming through a popular culture lens, as applied to spatial research. When applied to spatial data management education, pedagogy using popular culture can create highly unique and impactful learning experiences. Each lesson plan employs a specific popular culture trend or facet to introduce and reiterate these concepts. These lesson plans are freely and openly available to the community and are meant to provide GIS and data librarians with guidance for expanding how they teach spatial data management concepts to their respective campus researchers.

While these lesson plans have been employed in data management workshops in an academic library setting for students, staff, and faculty, no formal data (beyond anecdotal positive feedback from learners) has been collected to quantify their effectiveness. Therefore, future research will apply assessment techniques and participant surveys to better understand the impact of the lesson plans, and make changes as necessary using the framework outlined by Fitzpatrick and Meulemans (2011). Future research will also expand the number of topics represented by creating more lesson plans framing spatial data management through a popular culture lens.

As previously noted, it is important to reiterate that these lesson plans are not meant to devalue or take the place of traditional efforts in data management education, such as DataONE's Data Management Skillbuilding Hub (DataONE 2020) and the ESIP Data Management Training Clearinghouse (Earth Science Information Partners 2020). Among increasing mandates of data sharing, open data, research transparency, and reproducibility is a need for wide-ranging education on data management topics. These lesson plans contribute to the educational resources available for data management instruction and offer a new lens to understand these topics. Further, not every researcher will prefer to learn spatial data management through the popular culture lens. Therefore, it is beneficial for academic librarians to have various methods for teaching data management at their disposal. As the need for data management education increases, academic librarians must continue to innovate and refine the learning experiences they provide to their campus researchers around this topic and consider how popular culture may enrich these

experiences.

Supplemental Materials

The lesson plans are available on KiltHub, CMU's Institutional Repository, at https://doi.org/10.1184/R1/13350428.v1.

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Data Availability Statement

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References

Ansan, M., N. Mangold, P. Masson, E. Gailhardis, and G. Neukum. 2008. Topography of valley networks on Mars from Mars Express High Resolution Stereo Camera digital elevation models. Journal of Geophysical Research 113 (E7):E07006. doi: 10.1029/2007JE002986.

Billboard. 2015. The worst album covers of the '80s. Last modified July 21, 2015. Accessed November 28, 2020. https://www.billboard.com/photos/6531881/worst-album-covers-ofthe-80s.

Bishop, W., and T. H. Grubesic. 2016. Geographic information. Cham, Switzerland: Springer International Publishing.

Blank, G., and K. B. Rasmussen. 2004. The Data Documentation Initiative: The value and significance of a worldwide standard. Social Science Computer Review 22 (3):307–18. doi: 10.1177/0894439304263144.

Briney, K. A., H. Coates, and A. Goben. 2020. Foundational practices of research data management. Research Ideas and Outcomes 6:e56508. doi: 10.3897/rio.6.e56508.

Costello, E. K., C. L. Lauber, M. Hamady, N. Fierer, J. I. Gordon, and R. Knight. 2009. Bacterial community variation in human body habitats across space and time. Science 326 (5960):1694–7. doi: 10.1126/science.1177486.

Cox, A. M., and S. Pinfield. 2014. Research data management and libraries: Current activities and future priorities. Journal of Librarianship and Information Science 46 (4):299–316. doi: 10.1177/0961000613492542.

Cross, G. 2015. Consumed nostalgia: Memory in the age of fast capitalism. New York: Columbia University Press.

DataONE. 2020. Data management skillbuilding hub. Last Modified August 31, 2020. Accessed November 28, 2020. https://dataoneorg.github.io/Education/.

DnD Wiki. 2020. Adventure locations and ideas (DnD other). Last Modified April 23, 2020. Accessed November 28, 2020. https://www.dandwiki.com/wiki/Adventure_Locations_and_Ideas_(DnD_Other).

Eaker, C. 2014. Planning data management education initiatives: Process, feedback, and future directions. Journal of eScience Librarianship 3 (1):e1054. doi: 10.7191/Jeslib.2014.1054.

Earth Science Information Partners. 2020. Data management training clearinghouse. Accessed November 27, 2020. https://dmtclearinghouse.esipfed.org/.

Fitzpatrick, M. J., and Y. N. Meulemans. 2011. Assessing an information literacy assignment and workshop using a quasi-experimental design. College Teaching 59 (4):142–9. doi: 10.1080/87567555.2011.591452.

Garcia, A. 2020. Gaming literacies: Spatiality, materiality, and analog learning in a digital

age. Reading Research Quarterly 55 (1):9–27. doi: 10.1002/rrq.260.

Jubas, K., N. Taber, and T. Brown. 2015. Introduction. In Popular culture as pedagogy: Research in the field of adult education, ed. K. Jubas, N. Taber, and T. Brown, 1–10. Rotterdam, The Netherlands: SensePublishers.

Koh, A., and P. Benson. 2011. Exploring pedagogies in the popular culture and education nexus. Pedagogies: An International Journal 6 (2):123–9. doi: 10.1080/1554480X.2011.555196.

Krewer, D., and M. Wahl. 2018. What's in a name? On 'meaningfulness' and best practices in filenaming within the LAM community. The Code4Lib Journal 40.

Kriesberg, A., K. Huller, R. Punzalan, and C. Parr. 2017. An analysis of federal policy on public access to scientific research data. Data Science Journal 16 (0):27. doi: 10.5334/Dsj-2017-027.

Littman, G. 2014. Sympathy for the devils: Free will and Dungeons & Dragons. In Dungeons and dragons and philosophy: Read and gain advantage on all wisdom checks, ed. C. Robichaud, 7–22. West Sussex, UK: John Wiley & Sons, Incorporated.

Mayernik, M. S., L. Davis, K. Kelly, B. Dattore, G. Strand, S. J. Worley, and M. Marlino. 2014. Research center insights into data curation education and curriculum. In Theory and practice of digital libraries—TPDL 2013 selected workshops, ed. L. Bolikowski, V. Casarosa, N. Houssos, P. Manghi, and J. Schirrwagen, 239–248. Switzerland: Springer.

Office of Science and Technology Policy (OSTP). 2013. Memorandum for the heads of executive departments and agencies: Increasing access to the results of federally funded scientific research. Last modified February 22, 2013. Accessed November 28, 2020. https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp_public_access_Memo_2013.pdf.

Panumate, C., S. Xiong, H. Iida, and T. Kondo. 2015. Evolutionary changes of Pokemon game: A case study with focus on catching Pokemon. In ICEC 2015: International Conference on Entertainment Computing, ed. K. Chorianopoulos, M. Divitini, J. Baalsrud Hauge, L. Jaccheri, and R. Malaka, 182–94. Cham, Switzerland: Springer.

Paste Magazine. 2013. 30 of the worst album covers of the '80s and '90s. Last Modified June 21, 2013. Accessed November 28, 2020. https://www.pastemagazine.com/music/

80s-and-90s-album-covers/.

Pomerantz, J. 2015. Metadata. Cambridge: MIT Press.

Poole, A. H. 2015. How has your science data grown? Digital curation and the human factor: A critical literature review. Archival Science 15 (2):101–39. doi: 10.1007/s10502-014-9236-y.

Price, M. 2015. The lesson plan as a tool for library instruction. Paper presented at the Workshop for Instruction in Library Use (WILU) Annual Conference, St. Johns, Newfoundland Labrador, Canada, June 15. https://fisherpub.sjfc.edu/library_pub/45.

Snow, C. 2008. Dragons in the stacks: An introduction to role-playing games and their value to libraries. Collection Building 27 (2):63–70. doi: 10.1108/01604950810870218.

Strasser, C. A., and S. E. Hampton. 2012. The fractured lab notebook: Undergraduates and ecological data management training in the United States. Ecosphere 3 (12):art116–18. doi: 10.1890/ES12-00139.1.

Szeman, I., & O'Brien, S. (2017). Popular Culture: A User's Guide. John Wiley & Sons, Incorporated.

Tenopir, C., S. Allard, P. Sinha, D. Pollock, J. Newman, E. Dalton, M. Frame, and L. Baird. 2016. Data management education from the perspective of science educators. International Journal of Digital Curation 11 (1):232–51. doi: 10.2218/ijdc.v11i1.389.

University Consortium for Geographic Information Science. (2013). TeachGIS: GIS resources. Last Modified October 19, 2013. Accessed November 27, 2020. https://teachgis.org/gis-resources/.

Vose, T. 2012. Creative tabletop gaming: 'Dungeons & Dragons' and libraries (oh my)!. School Library Journal 58 (3):24.

Whyte, A., and J. Tedds. 2011. Making the case for research data management. DCC Briefing Papers, Digital Curation Centre, Edinburgh. Accessed November 27, 2020. https://www.dcc.ac.uk/guidance/briefing-papers/making-case-rdm.

Wright, R., and J. Sandlin. 2009. Popular culture, public pedagogy and perspective transformation: The Avengers and adult learning in living rooms. International Journal of

Lifelong Education 28 (4):533–551. doi: 10.1080/02601370903031389.