



(REVIEW ARTICLE)



Use of the DMP Tool to Design Data Management and Sharing Plans for Undergraduate Support Programs in STEM

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Abstract

The data management and sharing plan is an essential component of grant-funded programs, research proposals, and evaluation projects. Even mini-grants, which require fewer application materials, often require a basic, truncated data management and sharing plan. In a previous article, a data management life cycle was presented, including valuable information on the main elements of data management and sharing plans, as well as helpful writing strategies to enable the composition of plans that withstand careful inspection by grant proposal review panels [1]. This article describes a valuable, readily accessible online tool for grant writers that helps create and format data management and sharing plans for grant proposals focused on college initiatives designed to improve science, technology, engineering, and mathematics (STEM) academic and professional outcomes. The DMP Tool is an online platform with many features designed to simplify the creation of the data management and sharing plan. The platform allows users to preserve their plans and share them with others. The DMP Tool website also provides helpful information on data management and sharing plan formatting guidelines from well-known funding agencies.

Keywords: DMP Tool; Data Management; Data Sharing; FAIR Data; Undergraduate Support Programs

1. Introduction

The planning and development of high-quality grant- or institution-funded short- or long-term college STEM programs that target student academic and professional success and job preparation requires support from many stakeholders. From the initial STEM program proposal creation stage to the post-program evaluation of student outcomes and institutional impact, there are avenues for program-related data to be produced and analyzed. Implementing college-based STEM academic enhancement and career development programs can yield substantial data, including data from undergraduate and graduate students, faculty, apprentice-style research projects, social media, websites, photos, and videos. Whether required for program funding or simply a component of good program management practices, developing data management and sharing plans prior to program implementation is an important step for program directors and principal investigators.

Data management and sharing plans are not complex documents to write, but can be problematic. First-time and experienced grant writers alike often struggle to develop data management and sharing plans. Unfortunately, most new grant writers, presumably those who represent recent graduates and early faculty, were not trained to consider data management life cycle stages in graduate school or during faculty orientation initiatives. For experienced grant writers, constant changes to data management and sharing plan requirements can create gaps in understanding, leading to confusion and delays in plan construction. The use of virtual tools to prepare components of grant applications, data management and sharing plans, STEM program strategic plans, and logic models is an effective approach and may improve collaboration and the overall quality of the important STEM college program-related documents. The purpose

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of this article is to highlight the DMP Tool, a virtual platform for developing data management and sharing plans with many features that facilitate document production and editing.

2. Data Management and Sharing Plans

Data management and sharing plans are essential documents that specify how data derived from grant projects or institutional operations will be stored, secured, shared, and discarded. Intricate plans specify the data types and provide detailed methods for analyzing data. Data life cycles and timelines are also included in the plan, along with detailed information on the roles of specific individuals who will perform various actions. The National Science Foundation (NSF) and the National Institutes of Health (NIH) require data management and sharing plans to be incorporated into complex grant applications [2-3]. The complexity of the data management and sharing plan depends entirely on the nature of the undergraduate support program or the institution's mission, as well as on the data collection methods. All data management and sharing plans must incorporate FAIR guiding principles. Plan components must include methods that ensure that data collected from program or research activities is findable, accessible, interoperable, and reusable [4-5]. Data management and sharing plans may also be required by external reviewers to monitor alignment with program implementation and dissemination outcomes. Moreover, data management and sharing plans may be crucial documentation for meetings with potential investors and philanthropic organizations that want to ensure monetary investments are directed at institutions or programs that understand the importance of data maintenance and sharing. The first step to establishing your data management and sharing plan is to first identify the mission, goals, objectives, and program participants of the undergraduate support program for which data will be generated.

There are many types of STEM undergraduate support programs or STEM intervention programs (SIPs) that exist on college and university campuses, including programs that target student research infusion, students with physical and developmental challenges, graduate and professional school admissions, student academic achievement, student career development, student retention, and post-baccalaureate programs. Program directors or principal investigators must first carefully consider program objectives, as well as the activities or programmatic instructional strategies needed to achieve them, before writing the data management and sharing plan. At this planning stage, it is advisable to work in a group and allow external evaluators to review program information to uncover problems or overlooked issues that may negatively affect implementation. Also, during this stage, consider sources of data output. Typically, data will be generated from participants, program team members, research studies, external evaluations, recruitment procedures, and research instrumentation. The creation of metadata (e.g., data descriptions) is critical to achieving FAIR guidelines and is supported by several familiar digital programs, including Apache Atlas, Alation, and Collibra [6].

A previous article titled "Data Management Life Cycle for STEM Career Development Programs" addressed the importance of data management and sharing plans and offered a helpful data management life cycle to guide grant writers and STEM career development program directors [1]. The previously published data management life cycle comprises eight components: data planning, data collection, data preservation, data security, data analysis, data dissemination, data sharing, and data destruction methods. This article describes the use of the DMP Tool software (www.dmptool.org) as a beneficial virtual tool to help STEM undergraduate support program developers and researchers format their data management and sharing plans for grant proposals.

2.1. DMP Tool: Undergraduate Support Programs in STEM

Different data management tools may be necessary depending on the nature of the STEM support program or research project. There have been several recent review papers that provide helpful insights into many popular open-access data management and sharing plan creation tools used by the global research community [7-8].

These review articles organize data management tools (e.g., DMPonline, DMP Canvas Generator, GFBio, DMP Tool, easyDMP, Data Stewardship Wizard) by various characteristics to facilitate selecting the most appropriate tool for a specific purpose. This article focuses on the DMP Tool. The DMP Tool is an interdisciplinary data management and sharing plan development tool for designing generic plans for STEM programs or research projects. The DMP Tool website contains many completed data management and sharing plans, organized and searchable by funder, institution, language, and subject. There is also a helpful search window on the home screen to facilitate quick plan recovery of previously submitted public plans (Figure 1). The DMP Tool also enables review of data management and sharing plan format and content requirements for specific funding organizations such as the National Science Foundation and the National Institutes of Health (Figure 2). The DMP Tool provides helpful links to data management resources and allows plan developers to receive feedback on customized plans created using an interactive plan template wizard.

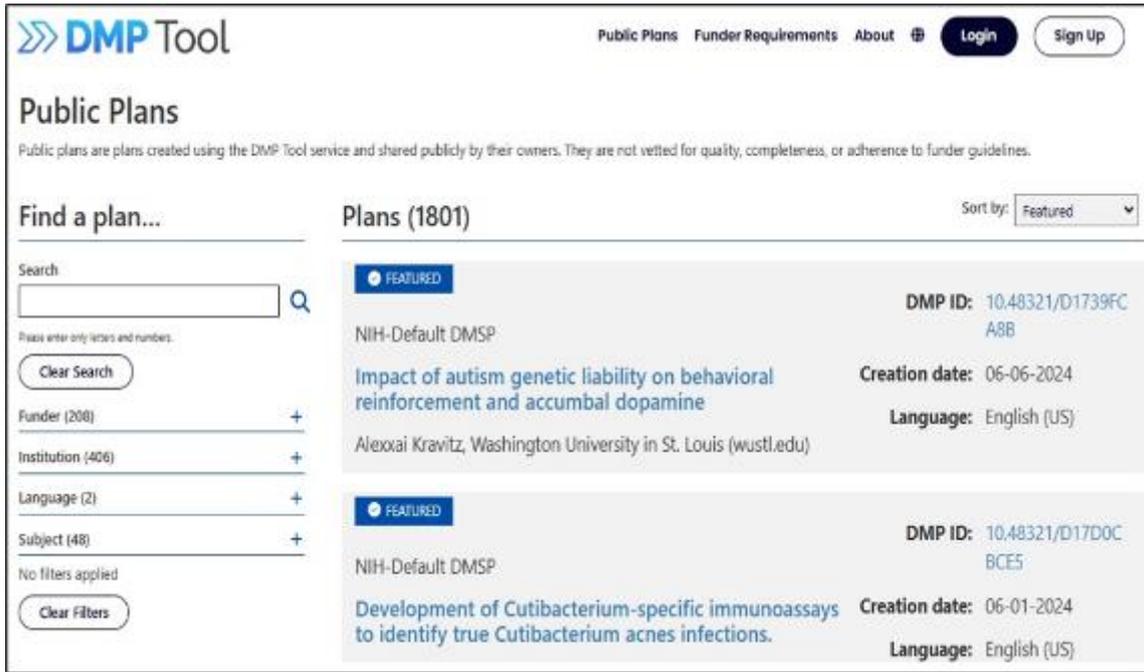


Figure 1 DMP Tool website screenshot of available public data management and sharing plans

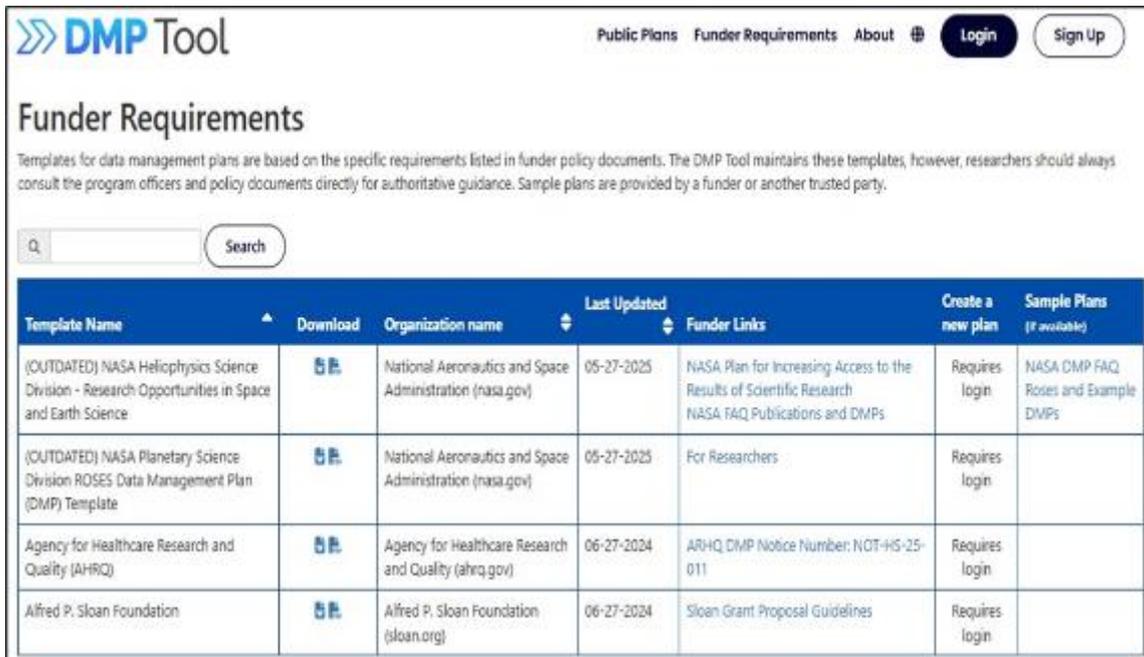


Figure 2 DMP Tool website screenshot of funder requirements for specific data management and sharing plans

3. Conclusion

Undergraduate support programs in STEM, work-based learning (WBL) programs, STEM intervention programs, or college internships are unique developmental programs designed to leverage theories, conceptual frameworks, pedagogical techniques, and evidence-based practices to strategically enhance STEM major knowledge, skills, comprehension, confidence, and success. These programs, collectively, are designed to improve student retention and prepare students for graduate programs or careers aligned with their degree programs [9-11]. Quality data management and sharing are linked to the sustainability of the undergraduate support program and institutional

growth. STEM undergraduate support program data types generally fall into three categories: program data (e.g., recruitment data, website statistics, photos, videos), social science data (e.g., qualitative and quantitative), and research data (e.g., raw experimental data, software applications).

Data management and sharing plans are documents that provide guidance regarding how different types of data will be collected, analyzed, shared, preserved, and destroyed during undergraduate support programs designed to improve student persistence and success after graduation. The most comprehensive plans are achieved when multiple program staff members contribute to developing the data management and sharing plan and when strategic data management activities are guided by the program objectives, participants, and goals. Developing quality data management and sharing plans at the front end of program development prevents a host of problems later, such as intellectual property disputes and accountability issues among program staff. While it is important to create a comprehensive data management and sharing plan on the front end, it may be necessary to revise it periodically due to unforeseen changes in program funding and implementation restrictions. From a strategic standpoint, one technique to promote FAIR guiding principles in the data management and sharing plan for social science and scientific research data is to use electronic laboratory notebooks (ELNs) and instruments that store raw data in real time on secure storage devices. The use of data management and sharing plan design tools may also enhance development efficiency and improve the level of collaboration required to produce effective plans that meet funding agency approval requirements. The DMP Tool is a freely accessible online platform designed to help grant writers, researchers, and administrators develop data management and sharing plans that are compliant with funding organizations.

There are many types of virtual general (e.g., interdisciplinary) and discipline-specific (e.g., life sciences) tools that enable the development of data management and sharing plans designed to help researchers present their data management protocols. Many of these electronic platforms offer helpful features that mitigate apprehension about plan design and promote the production of a comprehensive, adaptable data management and sharing plan. Virtual data management tool features include structured and customizable data management templates, a user-friendly interface, version-tracking components, information on funder plan guidelines, and compatibility with analytical software, as well as links to supplemental resources that improve data management and sharing plan creation. While there are many online platforms for developing high-quality data management and sharing plans, this article provides in-depth information on the DMP Tool. Usability research studies may yield recommendations to improve the DMP Tool and expand its impact on grant writers and program directors.

Review detailed articles on data management strategies if your program involves specialized research data, such as clinical research data, biomedical data, and multi-omics sequence data (e.g., genomics, transcriptomics, proteomics, metabolomics) [12-14]. Moreover, it will be interesting to examine how artificial intelligence (AI) plays a role in developing and editing data management and sharing plans. It is very likely that AI can enhance metadata development and interoperability among diverse types of data and analytical software. In conclusion, the web-based DMP Tool is a helpful, user-friendly tool for developing and editing data management and sharing plans for new and experienced grant writers and researchers.

Compliance with ethical standards

Acknowledgments

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References

- [1] Flowers L. Data management plans facilitate effective STEM career development programs. *International Journal of Science and Research Archive*. 2025; 17: 1290-1295.
- [2] Parham S, Doty C. NSF data management plans: Requirements, practices, and challenges. *College & Research Libraries News*. 2012; 73: 609-612.
- [3] Jorgenson L, Wolinetz C, Collins F. The NIH data management and sharing policy. *NIH Office of Science Policy Perspectives in Biology and Medicine*. 2020; 63: 485-493.
- [4] Wilkinson M, Dumontier M, Aalbersberg I, Appleton G, Axton M, Baak A, et al. The FAIR guiding principles for scientific data management and stewardship. *Scientific Data*. 2016; 3: 1-9.

- [5] Solle D. Be FAIR to your data. *Analytical and Bioanalytical Chemistry*. 2020; 412: 3961-3965.
- [6] Ulrich H, Kock-Schoppenhauer A, Deppenwiese N, Gott R, Kern J, Lablans M, et al. Understanding the nature of metadata: Systematic review. *Journal of Medical Internet Research*. 2022; 24: 1-13.
- [7] Pham N, Moulaison-Sandy H, Bishop B, Gunderman H. Data management plans: Implications for automated analyses. *Data Science Journal*. 2023; 22: 1-14.
- [8] Becker C, Hundt C, Engelhardt C, Sperling J, Kurzweil M, Muller-Pfefferkorn R. Data management plan tools: Overview and evaluation. *Proceedings of the Conference on Research Data Infrastructure*. 2023; 1: 1-7.
- [9] Li T, Oseguera L, Kirk C. Examining the influence of first-generation status on STEM socialization among undergraduates in a STEM scholars program. *Research in Higher Education*. 2024; 65: 417-438.
- [10] Breyfogle M, Castle K, Liu X, Shields G. Supporting STEM success through prematriculation undergraduate research. *Scholarship and Practice of Undergraduate Research*. 2024; 7: 55-60.
- [11] Anyidoho P, Gallant D. Benefits and challenges of virtual early arrival or summer bridge programs for underrepresented minority students majoring in STEM. *Journal of College Science Teaching*. 2025; 54: 51-56.
- [12] Cunha-Oliveira T, Ioannidis J, Oliveira P. Best practices for data management and sharing in experimental biomedical research. *Physiological Reviews*. 2024; 104: 1387-1408.
- [13] Houston L, Probst Y, Yu P, Martin A. Exploring data quality management within clinical trials. *Applied clinical informatics*. 2018; 9: 72-81.
- [14] Mittal D, Mease R, Kuner T, Flor H, Kuner R, Andoh J. Data management strategy for a collaborative research center. *GigaScience*. 2023; 12: 1-25.