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The Evolving Role of Academic Libraries in Supporting Data Use and Reuse

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Abstract

This study explores the evolving role of university libraries in supporting the use and reuse of research data within the university communities, with a specific focus on federal university libraries in South-East Nigeria. Adopting a descriptive research design and a quantitative approach, data were obtained from 196 academic library staff across five universities through a census-administered questionnaire. The data were analysed using SPSS version 25, employing descriptive statistics including frequency, percentage, mean, and standard deviation. Findings reveal that libraries are increasingly recognised as key enablers in the research data lifecycle. Respondents affirmed that strategies such as developing local data curation capacity; archiving, preserving and curating datasets for future use and reuse; documentation and providing metadata on research; integrating and documentation of dataset for use and reuse in reproducing new research; and identifying data/datasets that could be candidates for repositories are crucial strategies in promoting data use and reuse but unfortunately neglected by the university libraries. Hence, the outcomes of the study indicate that the libraries are generally perceived as underperforming in implementing robust data services, largely due to systemic challenges such as inadequate training, insufficient infrastructure, and the absence of institutional policies. Notwithstanding these challenges, the study emphasises that academic libraries have a strategic role as data stewards in advancing open science, enhancing research reproducibility, and maximising the impact of scholarly outputs. To fully realise this role, libraries must therefore provide the necessary infrastructure, policy frameworks, and professional support to empower researchers in managing and sharing data effectively. This study contributes to understanding how academic libraries can evolve from traditional service roles to become central actors in the academic data ecosystem.

Keywords: Academic libraries; data use; data reuse; evolving role; South East; Nigeria.

Introduction

In a world with growing needs for data use and reuse, the management of data becomes very important. Libraries, particularly academic libraries, play a precarious role to play in the use and reuse of research data by documenting and encouraging researchers to document data thoroughly (Yoon and Schultz, 2017). According to Pasquetto, Randles, and Borgman (2017),

"data reuse integrates many different activities, such as using one's data for future research, acquiring datasets from public or private sources to compare to newly collected data, or conducting reanalyses of one or more datasets to address new research projects. The implications of these activities for data science, public policy, data archive architecture, and research practice vary greatly. Making a distinction between a dataset's "uses" and "reuses" that are both contextual and temporal is a good place to start when thinking about data reuse as it relates to the current study. The initial usage of a dataset usually happens when the researcher or research team investigates it for a particular purpose, when data is gathered by an individual researcher (or a research team) for a project.

However, because the dataset is still rooted in the creators' context, it becomes a different use if the same researcher or research team revisits it later. The action turns into a dataset reuse

when the dataset is added to a repository, retrieved by another researcher, and used for a different study. Reuse, therefore, suggests usage of a dataset by someone other than the originator (Pasquetto et al., 2017). Therefore, the library, being the heart of research activities, plays a crucial role in the use and reuse of research data. Research support "services for the use and reuse of research data are growing areas of importance in academic libraries and are part of the libraries' larger goal to provide wider support for research-related services" (Pasquetto, Borgman & Wofford, 2019).

Statement of the Problem:

In the rapidly changing field of research and information management, data has become a critical asset across disciplines. However, despite the growing emphasis on data-driven research, many researchers and institutions face challenges in effectively using and reusing data due to issues such as inadequate data management skills, lack of awareness of data repositories, inconsistent metadata standards, and concerns over data quality and accessibility. Libraries, traditionally seen as custodians of information, are increasingly positioned to play a pivotal role in addressing these challenges. Yet, there is a limited understanding of how libraries currently support data use and reuse, the extent of their involvement, and the barriers they face in fulfilling this role. Hence, this research seeks to explore the role of libraries in supporting data use and reuse and explore how libraries can enhance their support for data use and reuse within the research ecosystem.

Objective of the Study

The objective seeks to examine the evolving role of academic libraries in facilitating the use and reuse of research data within university education institutions. Specifically, the study seeks to explore how academic libraries support the use and reuse of research data.

Research Questions

The following research question guided this study:

How are university libraries evolving to support the use and reuse of research data within the university communities?

Literature Review

Since academic libraries typically play a part in granting access to intellectual records in a variety of ways, it is not surprising that managing research data has emerged as a global concern for academic libraries. (Tenopir et al., 2015). Expanding upon the basis of information access, "libraries are well-equipped to suggest data description practices and repository features that will encourage use and reuse of research data" (Mannheimer, Pienta, Kirilova, Elman & Wutich, 2019). Many academic libraries, as part of their mission to provide enduring access to research data and support scholarly communication, now offer curation and preservation services (Pasquetto et al., 2019). Academic libraries are using digital preservation and curation, which are fundamental proficiencies of academic libraries in supporting data use and reuse, by engaging in curatorial practices in establishing data preservation. According to Brown, Wolski and Richardson (2015), "there is a new emphasis on preserving research data for use and reuse, this is a logical consequence of data having become more numerous, more complex, and more important". More and more journals, publishers, professional associations, and funding agencies now support Open Data, which makes raw data accessible to researchers for reuse. Hence, the "research process is transforming to become more investigative as it is now possible to assemble significant data collections that enable much broader problems to be addressed" (Brown, Wolski & Richardson, 2015). Therefore, to facilitate creative usage and reuse, research data must be organised, discoverable, and connected.

The process of making one's data available to other researchers for use in secondary analysis, data meta-analysis, reanalysis to verify the conclusions reported by the data producer, or any other legitimate research objective is referred to as "use and reuse of research data." Therefore, when data is gathered for one purpose and then used again for a different purpose, it is considered reused. Submitting data to a suitable repository (global or institutional) or making sure that data is explained and understandable to any other researcher who might choose to utilise it are two ways to encourage data reuse (Wilms et al., 2020). To describe datasets for future reuse, it can be helpful to utilise the right metadata formats. According to Thanos (2017), data reusability is becoming a "distinct characteristic of modern scientific practice that allows reanalysis of evidence, reproduction and verification of results and minimizing duplication of effort as well as building on the work of others". Thanos further noted that "data reusability has four main dimensional aspects namely policy, legal, economic and technological". The legitimate and procedural framework focuses on the open accessibility of scientific data, which allows jurisdictional boundaries to be overcome, including economic concerns, while the technological framework deals with various technologies in sharing data for reuse.

The importance attached to research data among stakeholders has resulted in the development of new services in most academic libraries. Academic libraries are perceived by many as key stakeholders, particularly concerning the management of their data for potential use and reuse by other researchers (Tripathi, Shukla & Sonker, 2017; Yoon & Schultz, 2017). According to Mannheimer et al. (2019:645), "academic libraries have skills and experience in generating metadata for research objects and datasets, in preservation and in facilitating access to and use of data". Hence, they are involved in teaching faculty members the necessary skills (technical/research data/management skills) for using data and integrating and documenting datasets for use and reuse in reproducing new research. Academic libraries are connecting existing data sources with faculty members for easy accessibility to reusable data and collaborating with researchers in designing and applying the systems essential for the use and reuse of research data (Yoon & Schultz, 2017). Academic institutions are focusing on the use and reuse of research data, which has tremendously enhanced the production of new knowledge, making academic libraries organise and store data to provide services to researchers in need of data. According to Tripathi et al. (2017:18), "academic libraries are playing an active role in sensitising researchers towards the importance of properly documenting, organising and preserving datasets for future use and reuse".

Academic library services take into cognisance the interests and research needs of faculty members by understanding the current practices, knowledge, and desired support in developing and maintaining research data for use and reuse. Academic librarians are providing services that include "helping researchers to deposit data in institutional repositories, supporting with data management plans, and consulting with research teams" (Tripathi et al., 2020). In addition, librarians are concerned with data curation to provide data for use and reuse. According to Lee and Stvilia (2017:11), data curation is the "management of datasets such as research data to make sure that data are accessible for use by other researchers beyond the lifespan and purpose of the project for which the data were collected". The importance of curation to data use and reuse cannot be overemphasised. Academic libraries are selecting and appraising data through curation expertise and best practice for the storage, organisation and preservation of research data for use and reuse. The UK Digital Curation Centre (2016) noted that "curation places emphasis on publishing data in ways that ease reuse and accountability and integration" and improves the long-term worth of existing data through availability for future high-quality research. Therefore, academic libraries are seeking an improved means to store and provide access to research data.

Academic libraries are known for the dissemination of raw and processed data for further use. Moreover, major steps in the data lifecycle from early planning to the creation of final data files are done to enable academic libraries to document the entire procedures as well as the data for use and reuse. However, most researchers are unaware of the worth of preserving research data for future use (Shamin, Winter & Gill, 2017). Some researchers lack the aptitude to express their data management strategies and how they will be preserved and disseminated for use or reuse. Hence, academic librarians are likely to support researchers in managing research data by providing technical infrastructure and support for definite data storage that will enable other researchers to use and reuse such data. Academic libraries are now leveraging cloud capabilities to store research data and make the same data available to researchers for developing new knowledge (Kim, 2020:11).

Most researchers confirm that academic libraries provide access to data for use and reuse, as librarians possess the expertise in issues relating to research data management. Academic librarians are essential to the administration of research data and the encouragement of data usage and reuse because of their extensive experience working with researchers and curating and conserving information. According to Grynoch (2016), the importance of "data reuse cannot be overemphasised as it not only saves cost from repeated or overlapping data collection, but also offers an alternative avenue to knowledge creation promptly". A study by Wilms et al. (2020) found that integration and reuse of research data from numerous sources permit researchers to generate new knowledge in a timely and resourceful manner. The study further noted that "RDM is an important prerequisite for a substantial and sustainable contribution to knowledge".

Therefore, it is imperative to investigate the reasons behind researchers' reluctance to save, annotate, distribute, and maintain their research data for future use. Although academic libraries are aware of their potential role and impact on research data management and curation, and have started (or are planning) to provide data management services, different institutional perceptions and needs regarding data management, which vary with institutional capacity (and/or boundaries) and policies, prevent all libraries from being in the same phase of development.

Using and reusing of research data has attracted various studies (Mannheimer, Sterman & Borda, 2016; Missier, 2016; Thanos, 2017; Van de Sandt et al., 2019; Pasquetto, Borgman & Wofford, 2019). According to research by Mannheimer et al. (2016), most datasets that are cited or downloaded adhere to the fundamental guidelines for promoting reuse: they are well-documented, prepared for usage with a range of applications, and distributed in deep-rooted, open-access repositories. Additionally, Mannheimer et al. (2016) identified three important characteristics that appear to support data reuse, including publishing in field-specific repositories, having your work indexed in several places online, and employing persistent identifiers. Similarly, a study by Van de Sandt et al. (2019) emphasised the importance associated with the reuse of research data, noting that researchers in every area of study are challenged with the pressure to share research data for reuse. The study also pointed out that the need for data use and reuse has an impact on how we conduct research in the first place, including how to document, publish, and distribute it. Perhaps most significantly, it has an impact on how we assess the research's impact, which is frequently determined by how much data is used and reused.

Furthermore, a study by Ohaji, Chawner, and Yoong (2019) on the role of data librarians in academic and research libraries using the data publication Pyramid, just like the DCC curation lifecycle model, envisions how research data is made accessible for use and reuse by academic libraries. The study noted that academic libraries store data in data centres and

repositories for use and reuse. Below is the Data publication pyramid illustrating the role played by academic libraries in data use and reuse.

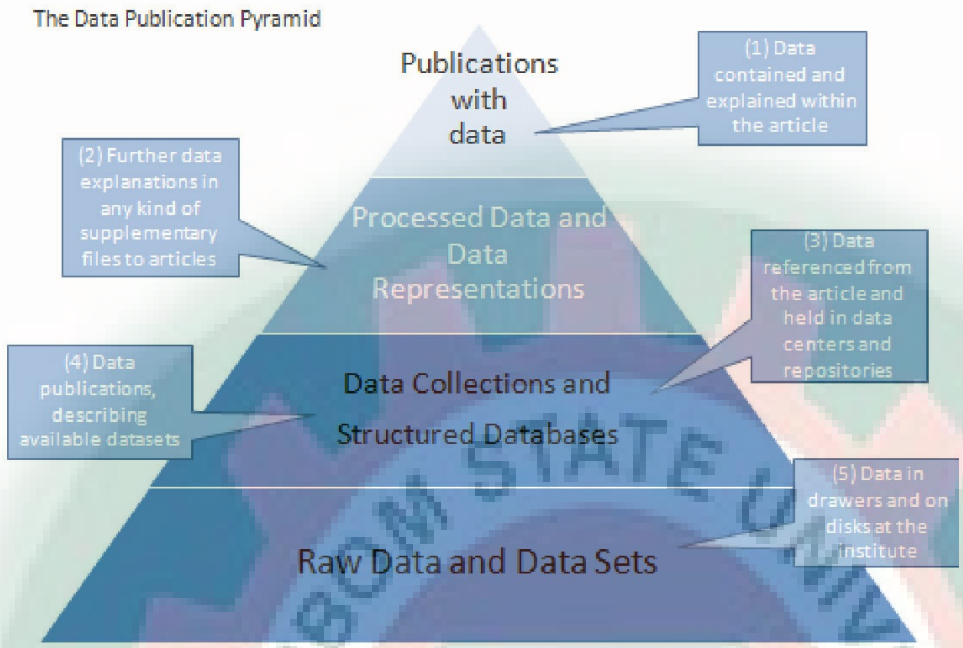


Figure 3.8: ODE Data Publication Pyramid (Reilly, 2011)

The base of the pyramid stands for the vast majority of research material that is still locally kept in its unprocessed form on discs and hard drives for future use. The first layer is the foundational level where unprocessed data is made available in its original form (e.g., spreadsheets, logs, and survey responses). Data that has previously been stored in repositories is visualised in the second layer of the pyramid. Academic libraries make this data available for use and reuse. The third layer of data is linked to publications as supplemental files to articles. The conventional view of an article or publication with data integrated therein is the top layer. The pyramid makes it evident that libraries have additional responsibilities and opportunities to guarantee data use and reuse.

The study further noted key roles for academic libraries in ensuring data use and reuse that include: Assisting researchers in making their data accessible and offering data search services; offering assistance for data management best practices; offering and instructing in meta-descriptions; offering guidance on the accessibility of subject archives and granting reuse licenses; promoting the use of permanent identifiers and best practices in citations; and selecting and training people in data curation; preservation: supporting appropriate data management procedures and data archiving.

From the above, academic libraries now respond to various needs regarding the management of data by supporting the needs of researchers and providing ongoing preservation and access to data for use and reuse. As many researchers are unswerving in generating research data, academic libraries are seizing the opportunity to show their worth towards the use and reuse of research data. There is no denying that an increasing number of academic libraries are also gathering, organising, and disseminating the intellectual output of their parent institutions and making it available for use and reuse, even though many externally produced information resources can be licensed and purchased (Lyon, 2016). Academic libraries have made data management and reuse a high priority, developing new tactics for use and reuse and

spotlighting the values of discoverability. The evolving roles for academic libraries are to ensure that data use and reuse result in further research. According to Wharton (2018:42), "academic librarians have been active in ensuring use and reuse of research data, making research data the focus of coordinated efforts". Academic librarians are also promoting data reuse by creating data catalogues for easily discoverable data in an innovative way during research activities. Academic libraries, as part of their new role in a data-driven environment, provide information about the availability of existing data sources for possible use and reuse.

Research Methodology

The study, anchored on a descriptive research design, employed quantitative approaches to solicit data. This design is suitable for collecting numerical data that can be statistically analysed in determining the libraries' roles in supporting data use and reuse. The population for this study comprised 196 academic library staff across the five universities in the South East of Nigeria. The administration of copies of the questionnaire was done using a census approach, and the data collected were analysed using the Statistical Package for the Social Sciences (SPSS) version 25. Demographic data and responses to the research question were analysed using descriptive statistics like frequency, percentage, mean, and standard deviation. The mean answers to 14 survey questions evaluating the use and reuse of data by libraries were the main focus of the investigation. Mean scores indicated broad levels of agreement. Each item was assessed on a Likert scale with SA = Strongly Agree, A = Agree, D = Disagree, and SD = Strongly Disagree.

Study respondents

This section includes completed questionnaires that were returned to the researcher, as well as the total number of questionnaires that were administered to the study population across the five universities. Table 1 below displays the answers.

Table 1: Response rate from the five institutions (N =165)

S/N	University Libraries	Number of questionnaires administered	Number of questionnaires returned	Response rate (%)
1	UNN	45	38	84.4
2	UNIZIK	43	36	83.7
3	FUTO	38	33	86.8
4	MOUAU	33	27	81.8
5	AE –FUNAI	37	31	83.8
TOTAL		**196**	**165**	**84.2**

Table 1 indicates that from 196 survey questionnaires that were distributed, 165 were returned and were determined to be legitimate and useful. Each university library had a response rate of more than 80% out of the 165 completed surveys. According to the data, AE-FUNAI had a response rate of 31 (83.8%), UNN Library had 38 (84.4%), and FUTO had the highest response rate of 33 (86.8%). The MOUAU Library had the lowest response rate, with 27 (81.8%), followed by UNIZIK Library, which had 36 (83.7%). Consequently, Table 1 displays an overall response rate of 84.2%, which is appropriate for any kind of study. An 80% response rate is generally considered very good and appropriate for most types of studies, especially in survey-based or social science research. Baruch and Holtom (2008) noted that an accepted typical response rate for research surveys is 80% or above. Dillman, Smyth and Christian (2014) also opined that high response rates, typically of 70% or more, can help ensure the validity and generalizability of survey findings. Similarly, Fowler (2014) stated that while

lower response rates can still yield valid results with proper weighting and analysis, rates of 80% or higher significantly reduce concerns over nonresponse bias. Therefore, the response rate of 84.2% for this study is not just appropriate but excellent.

Data Presentation based on Research Question

The data from the survey were analysed and presented in this section in line with the research question, as indicated in Table 2 below.

Table 2: Libraries' use and reuse of data

S/N	Libraries use and reuse data	SA	A	D	SD	Mean
1	Documentation and providing metadata on research	13 (7.9%)	21 (12.7%)	51 (30.9%)	80 (48.5%)	1.80
2	Dissemination of raw and processed data for further use	33 (20%)	41 (24.8%)	49 (29.7%)	42 (25.5%)	2.40
3	Selecting and appraising data through curation expertise and best practice for the storage, management and preservation	26 (15.8%)	40 (24.2%)	48 (29.1%)	51 (30.9%)	2.25
4	Archiving, preserving and curating datasets for future use and reuse	24 (14.5%)	33 (20%)	53 (32.1%)	55 (33.3%)	2.16
5	Identifying data/datasets that could be candidates for repositories	31 (18.9%)	27 (16.4%)	48 (29.1%)	59 (35.8%)	2.18
6	Reorganising and preparing data/datasets for deposit and reuse	37 (22.4%)	32 (19.4%)	49 (29.7%)	47 (28.5%)	2.36
7	Connecting existing data sources with faculty members for easy accessibility to reusable data	41 (24.8%)	50 (30.3%)	35 (21.2%)	39 (23.6%)	2.56
8	Integrating and documenting of dataset for use and reuse in reproducing new research	26 (15.8%)	37 (22.4%)	49 (29.7%)	53 (32.1%)	2.22
9	Bring data into faculty research-based learning	38 (23.0%)	41 (24.8%)	53 (32.1%)	33 (20%)	2.52
10	Developing local data curation capacity	11 (6.7%)	19 (11.5%)	60 (36.4%)	75 (45.5%)	1.79
11	Providing researchers with data advice	56 (33.9%)	31 (18.8%)	48 (29.1%)	30 (18.2%)	2.68
12	Making data available to third parties under a license or not	22 (13.3%)	41 (24.8%)	49 (29.7%)	53 (32.1%)	2.19
13	Use and reuse of data for institutional purposes	56 (33.9%)	37 (22.4%)	36 (21.8%)	36 (21.8%)	2.68
14	Appraising research data	41 (24.8%)	29 (17.6%)	55 (33.3%)	40 (24.2%)	2.43
	Aggregate Mean					**2.30**

Criterion mean **2.50**

The results in Table 2 show how libraries use and reuse data with a focus on Federal University Libraries in South-East Nigeria. Findings indicated that there is variation in terms of how libraries use and reuse data. The first five highest responses of strongly disagreed/disagreed with the statement on ability of the library to use and reuse data through the instrumentality of developing local data curation capacity, 135(81.8% $\bar{X}$ = 1.79), archiving, preserving and curating datasets for future use and reuse with 108(65.5%; $\bar{X}$= 2.16), identifying data /datasets

that could be candidates for repositories with 107(64.8%; $\bar{X}$=2.18), while 102(61.8%; $\bar{X}$=2.22) strongly disagreed/disagreed on the libraries ability to integrating and documenting dataset for use and reuse in reproducing new research as well as making data available to third parties under a license or not as means of the libraries to use and reuse of data respectively. This suggests that respondents generally leaned towards disagreement with most of the items regarding how libraries use and reuse data, with slight variations across the different aspects measured. This opens up an opportunity for librarians to provide these services for the use and reuse of data. Selecting and appraising data through curation expertise and best practice for the storage, management, and preservation did not receive affirmation responses as means of the libraries in using and reusing data, with 99(60%; $\bar{X}$= 2.25) strongly disagreed/disagreed.

In the same vein , 96(58.2%; $\bar{X}$ = 2.36) noted that the libraries are not reorganising and preparing data/datasets for deposit and reuse, while 95(57.6%; $\bar{X}$ = 2.43) strongly disagreed/disagreed on the libraries' role in appraising research data. However, results also indicated that some of the respondents strongly agreed/agreed on statements indicating the libraries' use and reuse of data. This finding indicates that research data will remain valuable for a long time to come; hence, preserving and making it accessible for further research is important. Findings from the current study show that the Federal University Libraries in South-East Nigeria are yet to take seriously the issue of Archiving, preserving and curating datasets for future use and reuse. Table 5.4 also shows that 93(56.4%; $\bar{X}$= 2.68) of the respondents strongly agreed/agreed on libraries use and reuse of data for institutional purposes, 91(55.2%; $\bar{X}$= 2.56) affirmation on libraries connecting existing data sources with faculty members for easy accessibility to reusable data as well as 87(52.7%; $\bar{X}$= 2.68) strongly agreed/agreed on libraries providing researcher with data advice.

Although several institutions have repositories for storing and making them accessible. The findings from the present study show that the respondents are sceptical about their role in selecting materials for repositories. This supports Oberhiri-Orumah and Baro's (2022) study, which identified obstacles to the development of IRs in Nigeria as being inadequate facilities, unsteady internet connectivity, a lack of funding, unbalanced power supply, difficulty in locating and gathering materials for the IR, a lack of skilled ICT personnel, copyright issues, and a lack of IR policies. Therefore, libraries are expected to play a growing role in educating researchers and developing more effective measures and tactics across institutions that would enable data use and reuse.

Conclusion

This study examined the essential role libraries play in supporting the use and reuse of data in an academic community. Findings from the survey indicate that libraries are increasingly recognised as essential facilitators of data use and reuse. Most participants acknowledged that developing local data curation capacity; archiving, preserving and curating datasets for future use and reuse; identifying data/datasets that could be candidates for repositories; integrating and documenting datasets for use and reuse in reproducing new research, as well as making data available to third parties, are strategies for data use and reuse. However, the data suggest that while there may be some efforts in data-related services, Federal University Libraries in South-East Nigeria are generally perceived as underperforming in terms of fully utilising and curating research data. This reflects systemic limitations, likely due to a lack of training, policy, infrastructure, or institutional support. The evolving role of libraries as data stewards remains critical in promoting open science and maximising the value of research outputs. Therefore, libraries are required to provide infrastructure, guidance, and tools that enable researchers to locate, understand, curate, and share data effectively for use and reuse. In conclusion, the role of libraries extends beyond traditional information services; libraries are integral to the

academic data lifecycle, ensuring that data is a valuable and sustainable resource for future scholarly endeavours.

Recommendations

Based on the findings, the data reveals a significant variation in how libraries support data use and reuse, particularly concerning their core responsibilities in managing data. The high percentage of respondents who strongly disagreed or disagreed with key statement points to gaps in capacity, infrastructure, and policy. Key recommendations stemming from the findings include:

1. Libraries should invest in training and upskilling librarians in data curation practices, as well as partnerships with data curation experts and organisations should be encouraged to foster knowledge transfer.
2. Libraries should adopt or upgrade digital repositories with robust preservation capabilities and establish clear policies and procedures for the long-term storage, management, and retrieval of datasets.
3. Institutions should provide libraries with modern infrastructure such as reliable data repositories, high-capacity servers, and data preservation tools to support long-term data access and reuse.
4. Institutions should develop institutional guidelines for dataset documentation as a prerequisite for data sharing, use and reuse.
5. Libraries should intensify efforts to educate users about the benefits of data use and reuse through training sessions, outreach programs, and integration of data literacy into academic curricula.

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