



Data Literacy Education Design Based on Needs of Graduate Students in University of Chinese Academy of Sciences

ECIL, Saint-Malo, France, Sep. 2017

Wu Ming^{1,2} Hu Hui¹

1 National Science Library, Chinese Academy of Sciences

2 University of Chinese Academy of Sciences





Content

- Background
- Methodology
- Results
- Conclusions



Background

1. In the context of e-science and data intensive environment, research data has become an important part of scientific findings. Researchers are encouraged or required to manage and share research data along with their research outputs by a series of research data management and sharing (RDMS) policies.
2. During the past few years, not only the researchers and graduate students have increased attention to RDMS around research lifecycle, but also services relating to research data management and data information literacy(DIL) education have attracted a great deal of attention of library.

Background

3. National Science Library(NSL) is an academic library affiliated to Chinese Academy of Sciences (CAS). In recent year, NSL has set up an subject librarian team with science discipline background. One important role of subject librarians is to expand library services to meet users' needs.
4. Since graduate students are both as users and as future creators of research data. In this study, NSL cooperated with University of Chinese Academy of Sciences(UCAS), and choosed graduate students in life Science College, UCAS to be participants. By means of questionnaires online, we conducted a data literacy survey. Based on a better understanding of their current situations and needs, data literacy education model is designed for library to improve graduate students knowledge and skills in DIL.

Methodology

1. Questionnaire

The 12 competencies of Data Information Literacy were used as a guide in designing the survey. Also further consideration was given to the specific situation of life science and graduate students of UCAS..

Part one: The status of graduates' data literacy

- ✓ Q: Basic idea about research data
- ✓ Q: Data management plan, collection and documentation
- ✓ Q: Data processing and analysis
- ✓ Q: Data preservation/ publication
- ✓ Q: Research data ethics

Part Two: The needs of graduates' data literacy

- ✓ Q: Attitudes towards data literacy education
- ✓ Q: The contents data literacy education needs



Methodology

2. Participants

The survey was carried out in Sep 2016, 59 graduate students who were enrolling in course offered by life science college, UCAS.

The subject area included genetics, botany, biology, zoology, biochemistry, molecular biology, bioengineering, cell biology, etc.

3. Statistical method

We used excel for statistical analysis of each questions. The percentage was the number proportion of total respondents.

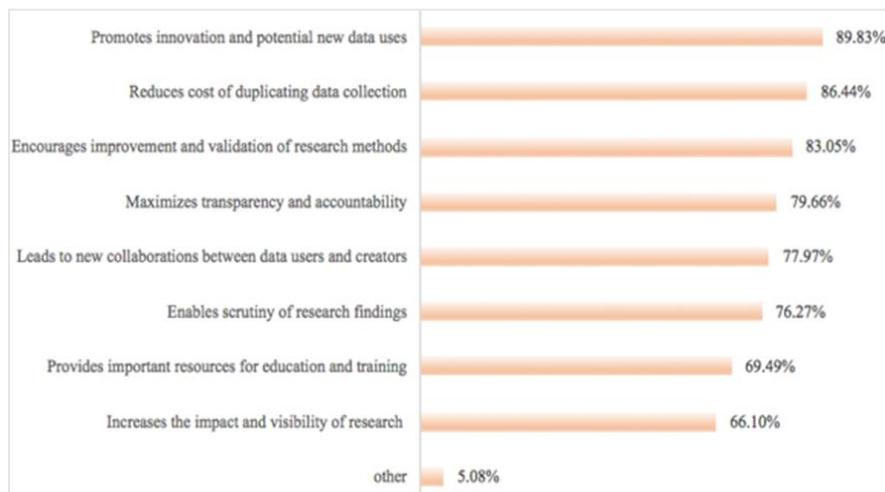


Results

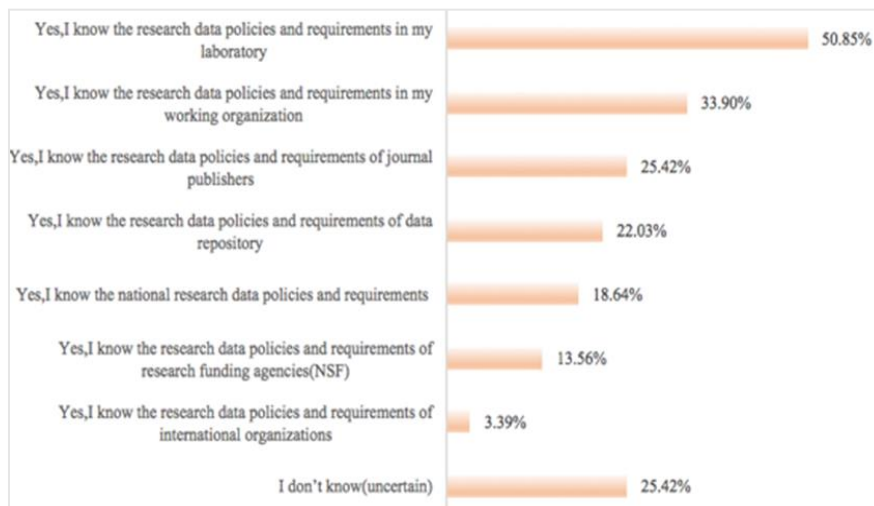
➤ The status of graduate students' data literacy

Basic idea about research data

Q. The importance of RDMS



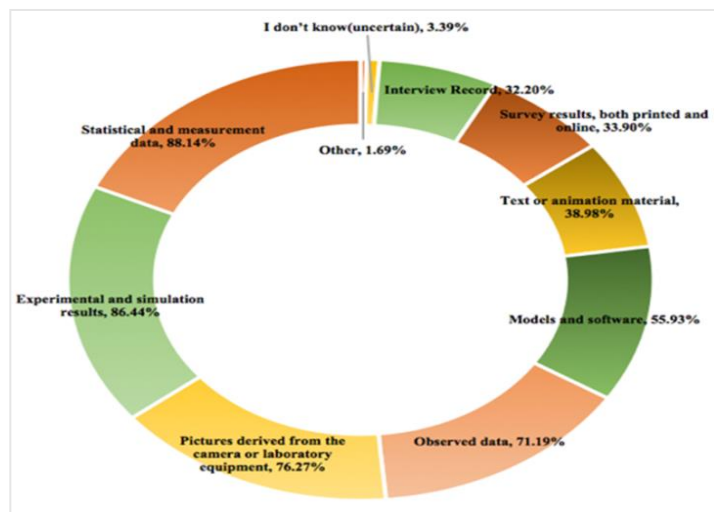
Q. Policies and requirements of RDMS



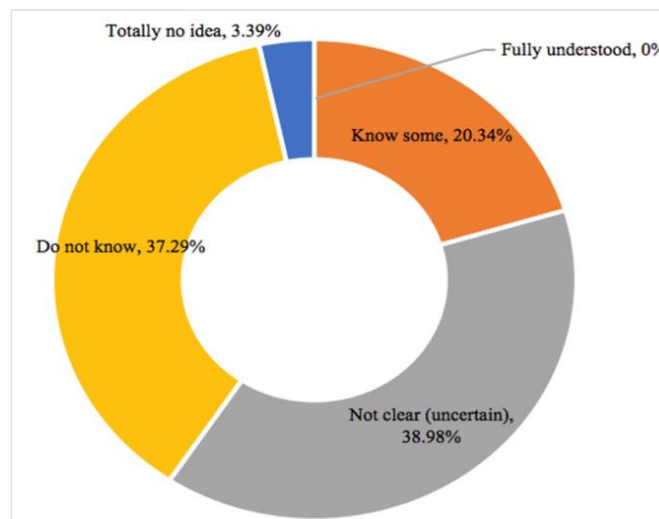
● Most of graduate students have a fully awareness about the importance of RDMS.

● But most of them lack knowledge about RDMS policies and requirements. Especially journal publishers, data repositories, research funding agencies data management policies and requirements.

Q. The Domain data type



Q. The research data lifecycle

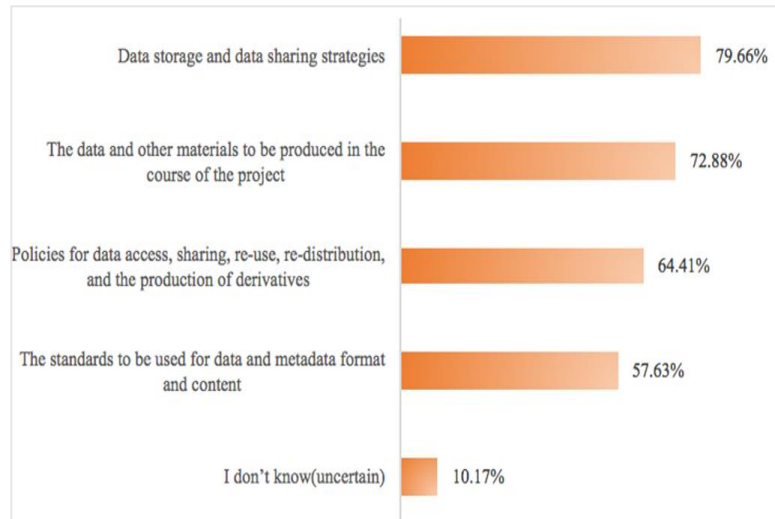


- Most of graduate students are clear about life science research data type.
- But most of them lack knowledge about concept of research data lifecycle.

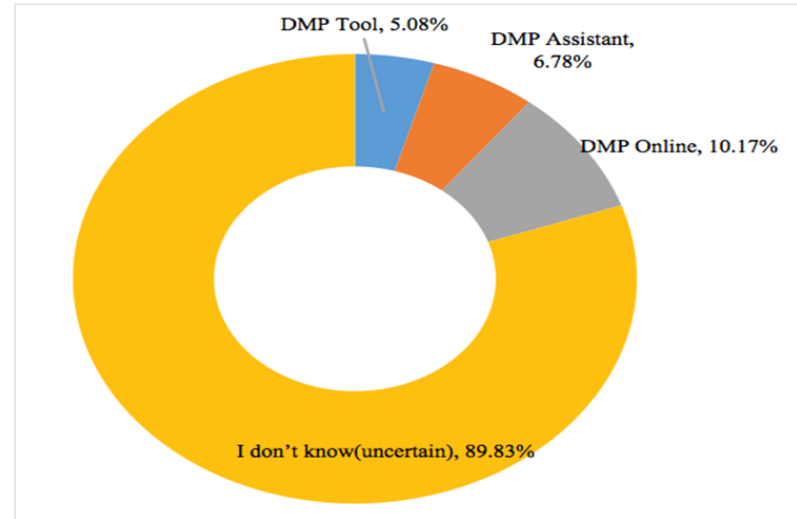


Data management plan

Q. The components of data management plan



Q. The data management plan tool

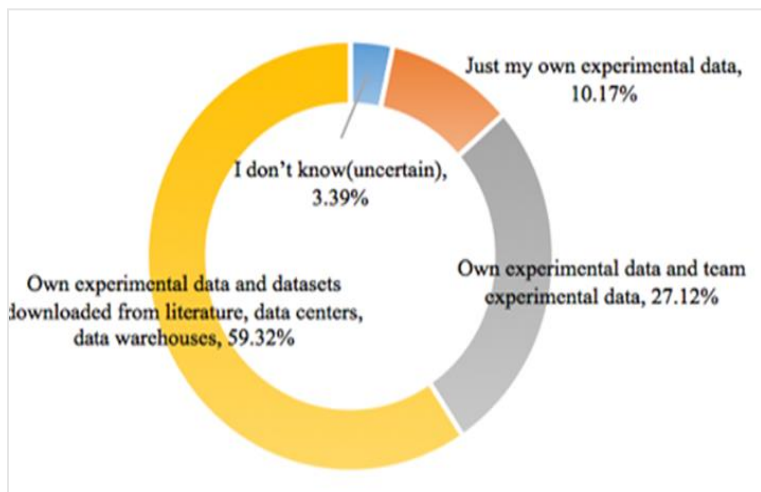


- Most of graduate students understand the components of DMP.
- But most all of them do not know how to use DMP tool.

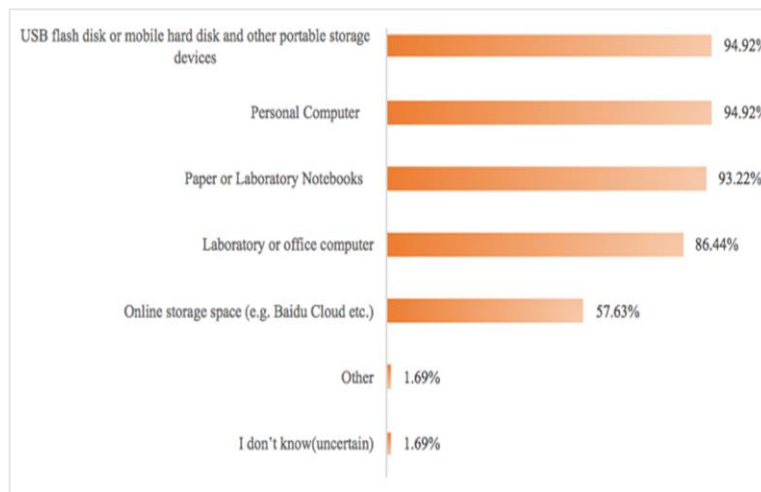


Data collection and documentation

Q. The sources of research data



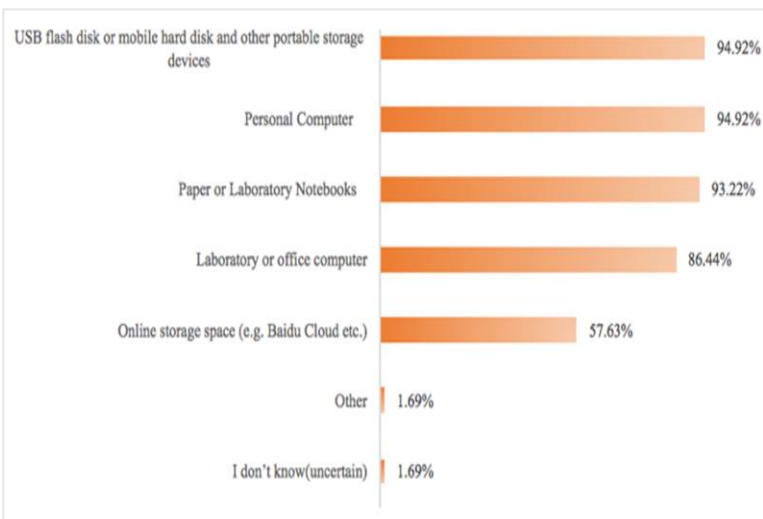
Q. The methods of recording and storing research data



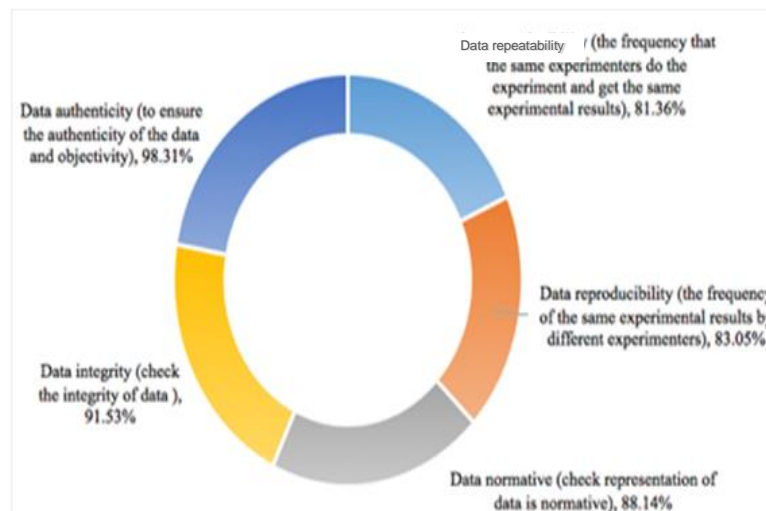
- Only 59.32% graduate students' data sources are from data center, data warehouses.
- And the most common way of data recording and storing are their own or team portable storage devices and computers.

Data processing and analysis

Q. The methods of recording and storing research data



Q. The quality evaluation of research data



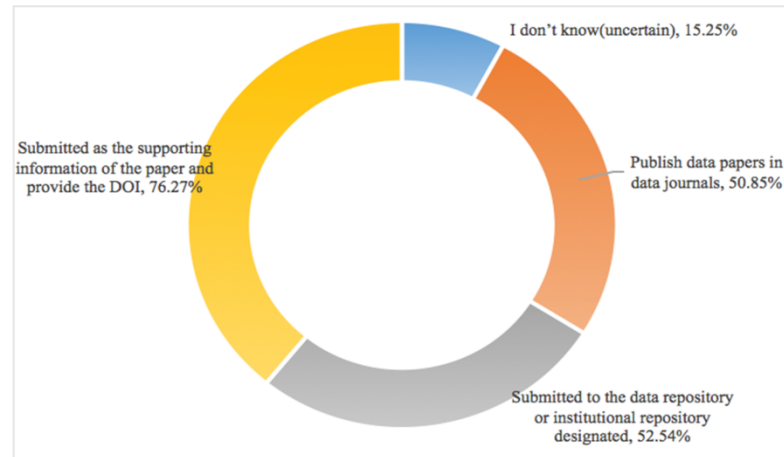
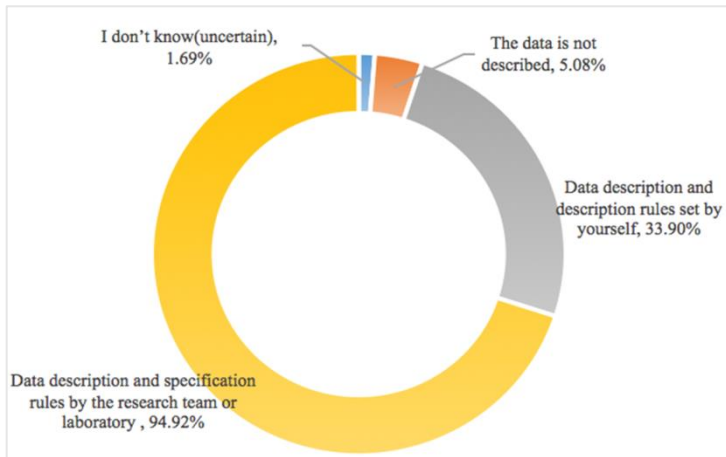
● Tools and software that graduate students mostly use for data processing and analysis are Excel, SPSS, and R and some life science special tools like Primer and SigmaPlot.

● Most students think the quality evaluation of research data is very important, especially authenticity, integrity and normative.

Data preservation and publication

Q. The description of research data (metadata)

Q. The way to publish research data

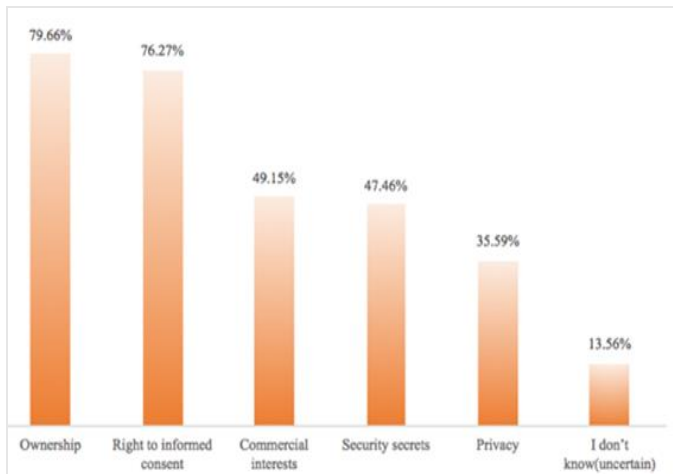


- 94.92% graduate students usually describe research data following rules of their research team or laboratory.
- Many of them know the way to provide DOI or submit to data repository.

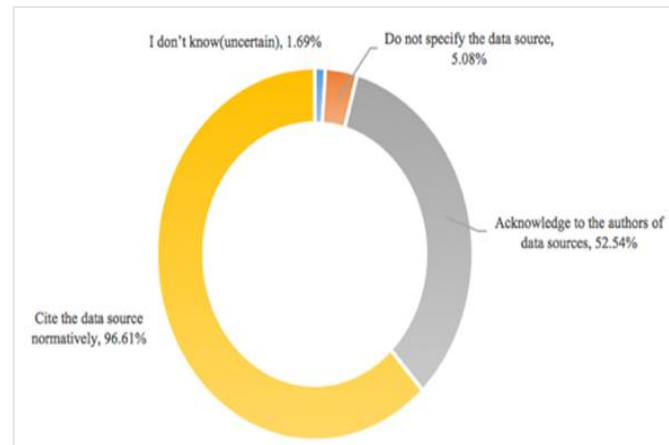


Research data ethics

Q. Research data ethics



Q. The behavior of data citation



- Not so many of the graduates clear the research data ethics, such as research data ownership.
- Most of graduates would cite the data source normatively and acknowledge to the authors of the data sources.



Results

➤ The needs of graduate students' data literacy

All of graduates think it necessary to have data literacy education before starting graduates' research and hope to improve their research data management skills. We also investigate the needs of data literacy education around data management lifecycle and education approaches. There are some differences in strength.

Data management lifecycle	The needs of data literacy education	Percentage
Data management plan	Tools of data management plan	89.83%
	Policies and requirements about data management and sharing	81.36%
	Research data life cycle	71.19%
	Elements of data management plan	61.02%
Data collection and documentation	The type, format and data volume of research data	94.92%
	Quality control and evaluation of research data	83.05%
	How to document and describe research data in fields	81.36%
Data processing and analysis	Tools to process and analyze research data	98.31%
	Data visualization	76.27%
Data management and preservation	Research data security	91.53%
	Research data store and backup	88.14%
	Metadata standards for describing research data in fields	81.36%
	Research data naming rules	62.71%
	Research data version control	47.46%
Data sharing and reuse	Retrieval and acquisition external research data	98.31%
	ways to publish and share research data	88.14%
	Standard for citation of research data	79.66%
	Ethics related to research data and protection measures	77.97%
	Research data sharing and license agreement	69.49%
education approach	Lecture	69.49%
	Online course	66.10%
	WeChat public, blog and other media	67.80%
	Credit course	61.02%
	RSS/Alerts	50.85%
	Workshop	27.12%

Results

➤ Data Literacy Education Design

Analysis results reveal the current situations and needs of graduate students in life science for research data literacy.

Our aim of data literacy education:

- Enhance the graduate students' awareness of data information literacy(DIL)
- Cultivate the graduate student's knowledge and skills of DIL

Three levels of learning around research data lifecycle are design :

- Level one-basic learning: develop basic knowledge of DIL
- Level two-advanced learning : learn research data management skills of DIL
- Level three-promotion learning: improve data literacy ethics.

The librarian can implement education services though credit curriculum, training and online self-learning for graduate students.



Conclusions

- ◆ Analysis survey results reveal life science graduate students' situation and need for data literacy.
- ◆ Design education three levels to help graduate students improve their data literacy.
- ◆ Implementation scenes of library services are designed, particularly in credit curriculum, training and online self-learning for graduate students.
- ◆ The conclusions provide a reference for designing a range of library data literacy education services for other disciplines.





Thanks for your attention!

Acknowledgements:

We would like to thank 59 graduate students of life science in University of Chinese Academy of Sciences (UCAS) who participated in the survey.

