

# RDM in Chemistry: How to Educate and Train Future Researchers to Manage Their Data

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**Abstract.** For in-depth research data management in chemistry, a cultural change is inevitable. To foster this change, future researchers need to be educated accordingly. The presentation will provide an overview of the first teaching approaches in student courses in chemistry at RWTH Aachen University. On the long range, the integration into curricular teaching is key to the cultural change.

**Keywords:** Chemistry, Education, Training, Data Management, Curricular Teaching

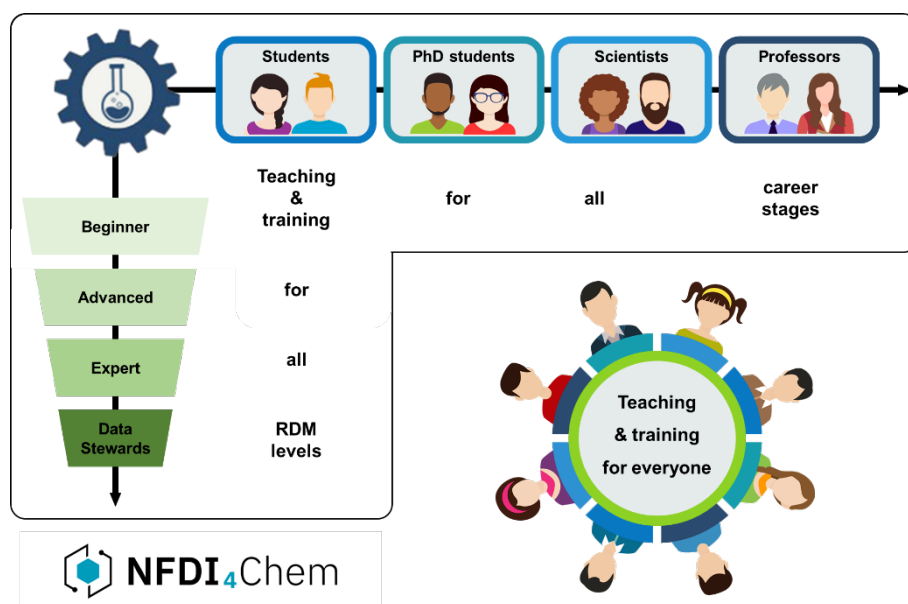
## 1. Introduction

More and more digital research data are generated in Chemistry. So, new concepts are essential: In which data formats can data be stored in the long term? How and where can data be stored? Which information of the experiment / the simulation should be noted in the metadata? How can these data be made accessible for group members and other researchers? How can these data be made findable for researchers and AI algorithms?

## 2. Teaching Approach

Researchers need to be trained in these topics and concepts to apply them successfully in their daily research processes. NFDI4Chem[1-4] tackles these challenges by providing several teaching and training courses and materials – for all career stages as well as all RDM levels (**Figure 1**). For example, we offer regularly different workshops on research data management or electronic lab notebooks. Furthermore, we believe that young chemists and students are key to the cultural change. Therefore, we are increasingly paying attention on education, e.g., providing teaching courses, teaching materials, and knowledge bases. This presentation will highlight the first teaching programs implemented in theoretical and practical student courses and collected feedback of students thereof. We have collected several years of experience on the integration of RDM into an inorganic student's lab course in the fifth semester, as a hands-on experience where students prepare special chemical substances and directly use the electronic lab notebook Chemotion to document this. Further, we deepen the RDM discussion in a Master lecture on sustainable polymerisation catalysis with case studies on good and bad RDM. Here, best practices from NFDI4Chem directly serve as case studies and are used for teaching. The students go into their Master theses having already the basics of RDM in mind which is an excellent prerequisite to apply on their own research data later on. The integration of these RDM units into the existing lab course and the existing Master lecture did not require large curricular changes which would normally need years at universities. In our approach, we

integrated RDM units seamlessly into the existing study programme which allows a fast integration into the actually running chemistry programmes. This method may serve as best practice also for other disciplines and their efforts to integrate RDM teaching into their study programmes.



**Figure 1.** Multidimensional teaching and training for the chemistry community.

## Data availability statement

Does not apply in total. Data of collected feedback to be published until presentation.

## Underlying and related material

Does not apply.

## Author contributions

Jochen Ortmeyer: Writing, Visualization, Presentation

Fabian Fink: Formal Analysis, Visualization

Alexander Hoffmann: Supervision, Conceptualization

Sonja Herres-Pawlis: Project administration, Supervision, Conceptualization

## Competing interests

The authors declare that they have no competing interests.

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