Plan Overview

A Data Management Plan created using DMPTuuli

Title: Crafting scientific explanation construction and argumentation oriented biology lessons

Creator: Jigna Nawani

Principal Investigator: Jigna Nawani

Data Manager: Jigna Nawani

Affiliation: University of Jyväskylä

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Project abstract:

Scientific explanation construction and argumentation are widely promoted as key scientific practices or cognitive learning processes for introducing children to science. However, these practices are often conflated. There is, thus, a lack of understanding of how teachers could instill these practices in their regular lessons. (Brigandt, 2016; FMEC, 2013). Recent empirical studies have focused on developing lesson-design models and tasks that support teachers in adopting these ambitious practices (Chen & Steenhoek, 2014; Nawani et al., 2018). However, research on classroom interactions has revealed that teachers continue to experience difficulties in planning lessons and orchestrating dialogic classroom talks that facilitate co-construction of knowledge. There is a growing consensus that a sustained, practice-based professional development (PD) can ensure effective adoption of these practices (Tekkumru-Kisa & Stein, 2017). The proposed research, therefore, aims to develop a PD program, which enhances teachers' professional vision and pedagogical design capacity for crafting explanation and argumentation oriented lessons. In this research, we will also conceptualize and determine the correlations between teachers' professional competence, dialogic classroom talk, students' learning processes and their situational interest.

The study involves two phases. First, we collaborate with in-service biology teachers (Grade 6, 9) to develop explanation and argumentation oriented *research lessons*. In the second phase, six teachers will participate in a two-year-long PD intervention study. During the intervention, each teacher will plan and implement four research lessons. Teachers will design at least one gender or culturally responsive lesson. All lessons will be videotaped. After the videotaping, students' situational interest will be evaluated using a validated questionnaire and interview (Lin, Hong & Chen, 2013). Additionally, students' learning processes will be evaluated biannually using validated PISA-like questions. The observer tool Stürmer and Seidel (2017) will be adapted to assess teachers' professional vision for explanation and argumentation oriented teaching. Teachers' pedagogical design capacity will be assessed from the artefacts developed during the intervention. Research lessons, PD approach, and correlational findings obtained from this study can inform policymaking, teacher training and 21st century STEM classroom practice.

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Copyright information:

Crafting scientific explanation construction and argumentation oriented biology lessons

1. General description of data

Date of the plan.

30/09/2018

1.1 What kinds of data is your research based on? What data will be collected, produced or reused? What file formats will the data be in?

The videotaped lessons, audiotaped debriefing sessions, and video-stimulated recall interviews will be analyzed and handled using ATLAS.ti or Videograph. The data formats for SPSS-data/Excel-data are .sav/.xls - formats and for video or audio recordings .mp4 and .mp3 format. Transcripts, translations, and content codings will be in .docx format. Quantitative data will be processed and analyzed using SPSS, R, and Mplus statistical programs. All other materials, such as questionnaires are saved as .pdf-files. Used software and formats are based on open standards to enable data reuse, interoperability and sharing. The data, content and specific methods, as well as analyses, are described in more detail in the research plan.

1.2 How will the consistency and quality of data be controlled?

The principal investigator along with the quality controller from the university will ensure that the following measures are followed to ensure consistency and quality of data:
All data files will be storied using checksums or Gitlabs to ensure that data is not corrupted when copying, transmitting, and saving it.
Besides, conversions to new file formats Project will name a quality controller who enforces that quality ensuring measures are followed.
Files will be stored using checksums that are used to ensure that data is not corrupted when copying, transmitting and saving it. We will also ensure that conversions to new file-formats (e.g. .docx to pdf) are made maintaining original information.

2. Ethical and legal compliance

2.1 What ethical issues are related to your data management, for example, in handling sensitive data, protecting the identity of participants, or gaining consent for data sharing?

- Collected personal data include, for example, the subject's name, contact information, the place where the subject is teaching or study (e.g. name and location of the school). This data are obtained from the data subject directly on the basis of consent. The data will be pseudonymised in the analysis phase (for more information, go to http://www.fsd.uta.fi/aineistonhallinta/fi/tunnisteellisuus-ja-anonymisointi). The data will be archived in a pseudonymised manner [SPSS or excel files].

2.2 How will data ownership, copyright and Intellectual Property Right (IPR) issues be managed? Are there any copyrights, licenses or other restrictions which prevent you from using or sharing the data?

The ownership and access rights of data **was agreed on when the data management plan was created**, prior to the start of actual research.

3. Documentation and metadata

3.1 How will you document your data in order to make it findable, accessible, interoperable and re-usable for you and others? What kind of metadata standards, README files or other documentation will you use to help others to understand and use your data?

Model clause

The project shall name a team member responsible for monitoring and enforcing these data documentation rules. This documentation and metadata and their publication will ensure FAIRness of the data.

When anyone saves data on the project's shared network storage space (provided and technically administered by University of Jyväskylä, including backups, access control and security), that person shall also update and maintain this documentation:

The storage root, as well as every sub-folder, shall include README.txt file. Each README.txt file describes the current naming conventions and purpose of all folders and files in that level of storage organization. Any additions, deletions or changes to naming conventions or purposes are immediately updated to README.txt.

Each master data file [e.g. .mp4 or .sav] will be clearly named as such [master_video_ OR master_questionnaire], and each will always be accompanied, in the same folder, by two files:

1) ABOUT_filename.txt which contains a link to an initialized entry in a metadata repository.

2) METHODS_filename.txt which/METHODS_foldername.txt contains link to, or text of, description of methods used to obtain, process and document the data, in detail sufficient to allow replication and understanding and usage of the data for other purposes.

 Both the ABOUT and the METHODS –files [and preferably a preliminary metadata entry in a repository] will be created immediately as the data gathering begins, and amended and updated throughout the research project as data is building up. These will then be readily available to convert to machine-readable formats upon archival or publication of the data.

4. Storage and backup during the research project

4.1 Where will your data be stored, and how will it be backed up?

Research data of the project will always be stored in a network drive provided and managed by IT-services of the University of Jyväskylä. These network drives are also used to share files safely between participants using VPN.

Systems will take automatic backups of the data to prevent catastrophic loss of data. In addition, manual backups of master data files will be taken regularly [every six-months] and always before any major file-format or data conversions.

4.2 Who will be responsible for controlling access to your data, and how will secured access be controlled?

Right to access the data is controlled by the principal investigator, and technical access control is provided by IT-services of the University of Jyväskylä.

Access to the data will be documented and PI will be at any point able to tell who has access to what data.

5. Opening, publishing and archiving the data after the research project

5.1 What part of the data can be made openly available or published? Where and when will the data, or its metadata, be made available?

Metadata entries will be published immediately when they can be considered sufficiently complete, even if the data itself is not yet public. (For description of creation and curation of metadata entries please see Section 3 of this plan.) Metadata can be found via ETSIN –metadata search engine.

Data itself, complete with full description of methods, will be published as datasets are completed in [JYX repository].

5.2 Where will data with long-term value be archived, and for how long?

University of Jyväskylä will store all data archived in JYX indefinitely (for minimum of 10 years), in the format originally deposited in, but does no special packaging or continuous curation to guarantee long-term integrity and usability. Data with long-term value will be proposed to national Tutkimus-PAS (system for true long-term research data storage). National and university-level policies for determining eligibility for Tutkimus-PAS are currently being developed, but not available yet.

5.3 Estimate the time and effort required for preparing the data in order to publish or to archive it.

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Most of the preparation of data will be done already while collecting and analyzing data, as focus is in creating understandable, interoperable and shareable datasets right from the beginning. For description of creation and curation of metadata entries and supporting information, please see Section 3 of this plan.

Final preparation of the data and publishing it will require about 18-20 hours. This will be supported by Open Science Center of University of Jyväskylä. Anonymization of personal data will again require roughly 8 - 10 hours.