7-8-2021

Practicing Self-Regulation of Cognition and Motivation during Problem Solving in Engineering and Mathematics

Oenardi Lawanto
Utah State University, olawanto@usu.edu

Recommended Citation

Lawanto, O. (2021). Practicing Self-Regulation of Cognition and Motivation during Problem Solving in Engineering and Mathematics. Utah State University. https://doi.org/10.26078/B9M9-PV50

SELF-REGULATION OF COGNITION AND MOTIVATION DURING PROBLEM SOLVING IN ENGINEERING AND MATHEMATICS

Data Management Plan

In compliance with the Institutional Review Board (IRB) and university policies, appropriate data will be rendered anonymous and shared publicly to allow other researchers to have access to our work extending the useful life and adding additional analysis options beyond the project lifecycle. The infrastructure for storing, organizing and sharing this data will be Utah State University's research repository Digital Commons. The research repository conforms to industry standards for long term data management, dissemination and presentation and is an online collaborative work space. During the three-year program period, data will be collected, stored, distributed, and shared in accordance with the protocol.

1. Data Collection and Storage

Three types of data will be generated over the course of the proposed IUSE project, including raw data, metadata that defines how these raw data were generated, and secondary products (i.e., analyzed data).

Several types of **raw data** will be generated using data collections tools and instruments developed under Component 2.

- Video/Audio-recordings of participant think aloud protocols (digital MPEG HD format);
- Audio-recordings of interviews with participants and instructors (digital WMA format);
- Written transcriptions of interviews with participants and instructors (digital DOCX format);
- Written transcriptions of selected excerpts from video/audio-recordings of engineer think aloud protocols (digital DOCX format);
- Observational field notes describing course context (digital DOCX format);
- Copies of course and problem artifacts (digital PDF format).

Several types of **metadata** will be produced in relation to the raw data **during Component 2**:

- Letters of informed consent (digital pdf format, hard copy kept in locked cabinet in a locked room).
- Files in which participants' names correspond to participant ID codes to protect their confidentiality (hard copy kept in locked cabinet in a locked room).

Several types of **secondary products** will be generated from the raw data **during Components 2 and 3**:

- Quantitative analyses results from PMI and BRoMS survey data (digital XLS and SPSS format);
- Qualitative codes of data entered into Dedoose qualitative analysis package and codebooks (digital DOCX format);
- Instructional materials developed for workshop and conference dissemination (digital DOCX and pdf format);

- Research-oriented and practitioner-oriented articles in peer-reviewed journals and conference proceedings (digital DOCX and pdf format).

Raw data (on which analyzed data is generated) will be collected from research project activities using a number of data collection tools and instruments developed during Component 1. To ensure privacy, each participant's name will be removed from the raw data and replaced with a participant ID code. The ID code will be used to match the data to the participant. The list linking codes to participants will be maintained by the researchers and kept in a locked cabinet in a locked room.

Interview and think aloud sessions will be recorded, transcribed, and coded. In addition, to avoid any loss of artifacts (i.e., physical copy of the course syllabus, print-out of information from website about the course and program curricula), classroom observation notes, and all transcribed documents (i.e., interview, think aloud) collected will also be digitized (once each data collection process is completed). The digital data will be stored on USU's secure electronic repository, USU Box. Hardcopy data will be stored in a locked file cabinet in a locked room. All digital files containing participant information will be de-identified prior to being stored electronically. Materials that identify subjects (letters of informed consent, participant ID code key) will be destroyed after three years.

2. Data Distribution and Sharing

Because Institutional Review Board (IRB) policy restricts the dissemination of research data collected, the project team has consulted with the IRB officers at Utah State University about the extent to which publishing research data are allowed. Support for data management for this project throughout its lifecycle will occur using the Utah State University's institutional data repository Digital Commons. This is a web-mediated software platform designed for scientific collaboration and sharing of scientific data. It provides workflows and tools for upload, identification and dissemination of data as well as services to ensure data security, fidelity, backup, and mirroring. The data management system comes with a set of default policies and functionality that addresses privacy and confidentiality, intellectual property and copyright, and access and sharing of data.

Individuals who demonstrate a legitimate educational interest in gaining access to this Web-based platform infrastructure will be required to complete an online request form (or email the PI or the Co-PI), stating the purpose for accessing the raw data of our projects and how they plan to use them. If the request is granted, requesting individuals will file proper IRB clearances. Once an IRB protocol has been approved, users may download the de-identified project data. We will expect anyone who uses the data to share with the public their findings or lessons learned through the same Web-based infrastructure. In addition to the above-described Web-based platform infrastructure for data release, we will release the relevant data in the form of journal articles and conference presentations.