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CAREER: Advocating for Engineering through Hidden Curricula: A Multi-Institutional Mixed Method Approach

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Data Management Plan

The following data management plan describes the manner by which expected data, metadata, and secondary products will be generated and how these products will be managed. Phase 1 survey data will be collected by Dr. Villanueva, the graduate students hired, and the external evaluator, Dr. Hill. Phase 2 data will be collected by the training consultants, Dr. Villanueva, the graduate students hired, and the external evaluator. Phase 3 data will be collected by Dr. Villanueva, the graduate students hired, the external evaluator, the training consultants, and the policy analyst, Dr. Ryan. Although the institutional advocates and the advisory board will be involved in important aspects of the project, they will not be collecting data although discussions about results and data analysis may take place.

1. Expected Data

Phase 1 (Early-Stage Exploratory Study):

The *metadata* produced from this product are:

- LEARNS-HC, FEELS-HC, SEES-HC instruments entered in a statistical analysis package
- Responses to demographics items found in the LEARNS-HC instrument

Secondary Products:

- Video training materials for engineering students, educators, and student support personnel on the hidden curricula in engineering in MP4 format

Phase 2 (Design and Development Study):

The *metadata* produced from this product are:

- SEES-A-HC instrument entries entered into SPSS or other statistical analysis package
- Qualitative codes of journal entries entered into MAXQDA 12 or other mixed-method analysis package
- Transcriptions of discussion with institutional advocates and training consultants in the development of the training materials and qualitative codes entered into MAXQDA 12 or other mixed-method analysis package in a digital DOCX format
- Transcriptions of focus groups soon after the training session from engineering faculty, students, and representative from each institution in a digital DOCX format
- Qualitative codes of these transcriptions will be entered into MAXQDA 12 or other mixed-method analysis package

Secondary products generated from this project will include:

- Video, presentation, and handout training materials for engineering students, educators, and student support personnel on the hidden curricula in engineering and strategies to reveal and navigate through it
- Online repository, links and QR codes for widespread use and dissemination across conferences such as the American Society of Engineering Education and community

Phase 3 (Efficacy Study):

The *metadata* produced from this study are:

- Qualitative codes of video recorded training sessions from the College of Engineering faculty, students, and representatives entered into MAXQDA 12 or other qualitative analysis package
- LEARNS-HC, FEELS-HC, SEES-HC instruments entered in a statistical analysis package
- I-clicker responses to select demographics items in training session in XML format

Secondary products generated from this project will include:

- Policy reports for each institution in a digital DOCX format
- Audio recorded transcriptions from phone or Skype conversations during advocacy period with participants; coded transcriptions will be entered in MAXQDA 12 or other mixed-method analysis package
- Online repository which will include the top list items, images from T-shirt designs, and video logs that highlights engineering *academic norms* shared by the institutions. The

videos will be edited and any identifiers removed before being used for widespread dissemination.

2. Standards for Data Format and Content

a) Engineering Educator and Student Data: To maintain the participants' confidentiality, all identifying information will be removed from the hard copy transcripts of the video/audio files before they are uploaded into any repository. Prior to any upload (audio or video), written permission will be attained from the participants before use in any venue (research or non-research). No data will be uploaded until this permission has been attained. Any additional data to be used for publications and presentations will be de-identified and analyzed in composite. Raw data will be kept in the locked office in the locked cabinet of the PI for at least five years after the data has been published or 5 years after the project completion, whichever comes first.

b) Metadata: All identifying information in data will be removed prior to analysis in a mixed-method or statistical software packages (e.g., MAXQDA 12 and SPSS). All files, kept on a password-protected hard drive, will be in the PI's locked filing cabinet in a locked office.

c) Secondary Products: Any secondary products to be disseminated broadly (e.g., online repository) will be done upon receiving written consents from the participants at each site.

3. Policies for Access and Sharing

According to USU's Institutional Review Board (IRB), other researchers can view the data after the project is over and after identifying information has been removed. Although we will not provide open access to the participant data, the PI can make it available upon written request (and permission) to any researchers who might want to view it one year after the project phases pertinent to the data has been completed and/or the information has been analyzed, de-identified and submitted for publication. As noted previously, all identifying information will be removed before the data is made available to any researcher and all data to be used in the workshops will be done in composite form with non-identifiable information. No engineering faculty, representative, or student names will appear in any website or repository unless a written permission is provided by the individual themselves. The statistical consultant (Dr. Hunt) will be responsible for analyzing the quantitative and qualitative data for each phase under the USU IRB oversight. The external evaluator (Dr. Hill) will be responsible for collecting the evaluative data under the Utah State IRB oversight. The training consultants (Drs. Smith and Tull) will be responsible for collecting aggregated information to construct training session content under the Utah State IRB oversight. The results of data analyses will be shared through publications and conference presentations, but all participant identifiers will be removed from all data excerpts prior to publication. In the unlikely case that the journal editors request access to raw data or metadata, the PI will make the following items available to them: (a) tabular or graphical comparisons of participant entries; and (b) raw de-identified data, such as training session transcripts.

4. Policies for Re-Use, Re-Distribution, and the Production of Derivatives

Secondary products generated by the proposal, such as the dissemination of the video training materials, will be made widely available for all engineering educators and student support personnel of charge. The training materials and content will include the condition that all educators using these products can copy the materials, and distribute them freely in their own instruction, but cannot sell or use them to make a profit. Any data collected to draft manuscripts and reports will be shared at annual conferences including American Educational Research Association, Frontiers in Education, and American Society of Engineering Education Conferences.

5. Plans for Archiving Data

Hard copies of data will be destroyed immediately after identifiers have been removed. A secondary copy of these data will be kept on a password-protected hard drive in a locked cabinet in a locked office in a location that is safeguarded against fire and water damage. Five years after the completion of the project, any items with identifiers (e.g., consent forms) will be destroyed. De-identified data will remain in the hard-drive for five years after the project has concluded to enable future analyses.