

Engaging with the Multiple Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD): A Special Session

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Abstract— The Multiple Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD) is expanding from 14 to about 100 institutions across the USA. This special session aims to introduce participants to MIDFIELD, explore how to conduct research with such a resource, and explain how participants can access MIDFIELD.

Keywords—retention studies, longitudinal studies, engineering persistence, MIDFIELD

I. INTRODUCTION

The Multiple-Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD) includes longitudinal data for 1,301,105,237 undergraduates at 14 large public research universities since fall 1987 [1]. Of those, 235,829 students declared engineering as a major at some point in their undergraduate education. MIDFIELD is a comprehensive resource that contains a wealth of student unit-record data including demographic, enrollment, course performance, and graduation data. MIDFIELD institutions include 8 of the 50 largest U.S. engineering programs in terms of engineering bachelor's degrees awarded, resulting in a population that includes 13% of all graduates of U.S. undergraduate engineering programs. Females make up 22% of the engineering student population of MIDFIELD, which aligns with national averages of 20% to 25% from 1999 to 2013 [2]. African-American students are overrepresented in MIDFIELD. Partner schools graduate 15% of all U.S. African-

American engineering B.S. degree recipients each year, because MIDFIELD schools include six of the top twenty producers of African-American engineering graduates, including two Historically Black Colleges and Universities (HBCUs). The percentage of Hispanic students in MIDFIELD is not representative of the U.S.A. Three percent of MIDFIELD engineering bachelor's degrees are awarded to Hispanics while 9% of engineering bachelor's degrees in the U.S. are awarded to Hispanics. All other groups are representative of a national sample [2]. Thus, MIDFIELD is large enough to support analyses disaggregated by race/ethnicity and gender simultaneously. In this way, we avoid the limitations of synthetic cohorts or cross-sectional analyses.

MIDFIELD is being expanded to include student data from more than 100 institutions [3]. The current 14 partners are all public institutions, largely in the southeastern U.S.A. The expansion of MIDFIELD will include a more diverse set of institutions, including private, predominantly liberal arts, historically Black, and Hispanic Serving Institutions that together annually graduate over 60% of all undergraduate engineers in the country. This expansion will allow for comparisons to be made not only by standard demographic variables, but also by institution type. Importantly, member institutions will be able to benchmark their outcomes against peer and aspirational institutions. The database is also being made more accessible to researchers under strict data use agreements. This session is a critical link between potential researchers and the MIDFIELD team.

II. ENGAGING THE ENGINEERING EDUCATION RESEARCH COMMUNITY

A. Rationale for a Special Session

Reducing data to “dashboards” for easy comprehension and quick decisions by educational administrators and policy makers has the advantage of yielding data that are averaged, aggregated, and simplified, but aggregate summaries are incapable of describing the complexity of pathways comprising the undergraduate experience. The complexity of the experience is reflected in the complexity of the data. The goal of analysis is to discover the meaning in the complexity and communicate it effectively—often requiring effort in data management and expertise in data visualization that goes beyond dashboards and pie charts. Once the quantitative “what” of a story emerges, the qualitative “why” prompts further research. One of the goals of the MIDFIELD research team is to support a research community in asking new questions and providing the tools to answer them.

B. Goals of the Session

At the conclusion of the session participants should be able to:

- describe MIDFIELD
- discuss how new variables can be derived from MIDFIELD
- define quantitative and qualitative data types and structures
- outline research questions and methods of personal interest to them
- outline process to access MIDFIELD

C. Audience

The intended audiences for this special session include:

- (a) Researchers who are interested in accessing MIDFIELD for their own research.
- (b) Researchers who are interested in figuring out what advantages there would be for their institution to join the MIDFIELD partnership.

These audiences would be interested in this session because MIDFIELD is a unique research resource. This session represents an opportunity for the MIDFIELD team and interested researchers to co-design a process to make the database as accessible as possible to accelerate its use by the wider community.

III. SPECIAL SESSION FORMAT AND OUTLINE

The session format will include brief talks and demonstrations by the facilitators interleaved with participant interactions including think-pair-share, small-group discussion, and then working in groups arranged by research objective. We will solicit participants' research interests, connect their interests to methods of analysis, and build a common vocabulary for exploring student unit-record data. Our session designs are informed by years of experience in designing and implementing learning experiences for students in classes and labs and colleagues in workshops. Two of the workshop facilitators are facilitators for the National Effective Teaching Institute (NETI) [4].

1) Introduction and Objectives (5 min)

2) What is MIDFIELD and results (15 min):

Description of MIDFIELD including listing common elements of student unit-record data. Selected examples of the variety of types of research done using MIDFIELD to date.

3) Resources to facilitate use of MIDFIELD (35 min).

This section includes having participants identify research questions that they are interested in, moving to be with those of similar interests, and identifying data needed to answer these research questions

4) How do derived variables help in research? (30 min):

This section includes a discussion of what helper (derived) variables are, examples of some available in MIDFIELD, and a think-pair-share activity identifying other variables that participants would find useful.

5) Wrap-up (5 min):

Facilitators will gather feedback from all groups of participants in preparation for the design of research support materials.

REFERENCES

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