Engineering Education Graduate Program's Review Within USA

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Abstract

Engineering education (EE) research has become an established field within the past few decades, although its recognition and acceptance within the broader engineering community still need to be improved [1,2]. There are 56 universities with EE and STEM graduate-titled programs across the world. Over 37 of them are within the USA, and 20 of these 37 universities offer EE graduate programs, with Purdue and Virginia Tech universities being the first to provide tenured positions in this field. To recruit faculty and to place a new curriculum for emerging EE departments, a schema from current EE programs, successful/unsuccessful, is required. Therefore, we are interested in creating a data library from all EE programs within the USA in this study. The goal was to have a holistic view of the current graduate degree curricula and provide information on faculty qualifications and background for these programs. To conduct our data collection, we have posed several questions: 1) Which departments and colleges house EE programs? 2) What degrees are offered (Certificate, Master, Ph.D.)? 3) What kind of specializations are offered (e.g., STEM, EE) 4) What courses are offered? 5) What is the faculty distribution within EE programs?
To answer these questions, we developed a data collection procedure that inductively coded curricula and faculty information retrieved from publicly available university web pages. Data collection was done in the spring 2022 semester, starting with each university's corresponding department. First, we found the main school/college where the department/program/institute of EE was housed, then degrees and specializations were identified. After this step, we looked for offered graduate courses and credits through the departmental handbook, preferably the most updated version and re-entered the required information into our excel sheet. The last step of the data collection was dedicated to creating a profile of the faculty information.
Using evolving sub-categories to answer each question, we identified occurring themes through inductive coding and continually revised and refined our categorization over several iterations. For example, we identified similar core courses using all available degree programs. In addition, we developed main categories for courses at a Ph.D. level that could be useful for future curriculum development programs. Faculty distribution data includes their positions, interests/expertise, editorships, awards, and degrees. Curricula data consists of the elective, required courses (e.g., specializations, core, seminar, research methods, dissertation), and total credits needed to graduate. Preliminary results from repetitive course patterns helped us to categorize them into main course categories such as 1- Innovation and Design of EE Academic settings (IDEAS) 2- Research Methods, e.g., STAT 3- Technology Education 4- Issues in EE 5- Foundations of EE 6- History 7- Leadership, policy and change in EE education 8- Diversity, Inclusion, equity (DIE). Future research

needs more data collection on the students and faculty outcomes from these programs, which could help design a more cohesive graduate-level curriculum.

References

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