

## **How Do Engineering Educators Take Student Difference into Account?**

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It is considered good practice to teach with an awareness that groups of students will not be homogeneous, and will differ. Research tells educators to take into account specific student differences, including learning styles, socio-economic status, race, and culture. This important issue has been debated and discussed; however, little has been written about how engineering educators examine, consider, and use student differences in their teaching practice. This paper addresses the extent to which, and the ways in which, engineering educators take student differences into account when making teaching-related decisions.

### **Implications of Findings**

The results suggest that engineering educators are taking student differences into account, but that the differences to which educators attend may not be aligned with the differences that research suggests educators should address. The results suggest the following implications for faculty developers or others interested in helping educators more effectively take student differences into account:

**...differences to which educators attend may not be aligned with the differences that research suggests educators address.**

1. Assume that educators are already taking some types of student differences into account.
2. Recognize that changing teaching practice to take new types of student difference into account may vary across educators. Some approaches are (a) adding these new types of difference to existing practice, (b) integrating the new types of difference with existing practice, and (c) working to reconcile prior practices with new proposed practices.
3. Consider using a strategy, such as a CDM interview, to understand the educators' existing approaches to addressing difference so that any new approach is anticipated and supported.

### **Methods and Background**

The data for this study were collected as part of a larger study to understand how engineering educators make teaching decisions. The participants in this study were 31 engineering educators at a large public institution. Interviews were conducted based on the Critical Decision Method (CDM; see full paper at the link below for details). Participants were invited to explain teaching decisions in general and to identify two specific, recent, memorable decisions (a planning decision and an interactive decision). Interviews were transcribed and coded for evidence that student differences were taken into account.

Codes for “taking differences into account” included: academic level, behavior, race/culture, gender, profession, socioeconomic status, other. Difference was also evident in an analysis of educators’ language based on the number of times a subset of difference was indicated (“quantity”), word choice (e.g., some, a few, most), and other types of difference. This ten-category coding scheme was applied to all interview transcripts. The coding results were analyzed to address the questions about the extent to which educators accounted for student differences and the types of differences educators take into account.

### **What We Found**

A combination of quantitative and qualitative results was used to provide answers to the research questions. From a quantitative perspective, two metrics were identified for characterizing the extent to which the educators took difference into account: the percentage of the turn-taking events during the interview that were coded as addressing student difference in some way (prevalence) and the different types of student difference an educator mentioned (coverage).

Every participant took difference into account but these were not the same differences (as suggested by other research) that faculty should consider when taking student difference into account. While each participant discussed at least two of the difference categories developed for the coding scheme and described above (see full paper at the link below for details), no one talked about difference in terms of all 10 categories.

Qualitative case studies are also presented in the full paper (link below) that further illustrate the quantitative results described above. Three participants are described in detail and represent a range of student difference that was considered by all participants in the study sample. Case one illustrates a participant who focuses on student difference in many categories, particularly student behavior and level. In case two, the participant focuses on student difference in many categories, but with an emphasis on level. The participant in case 3 minimally focuses on differences.

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