

## **Engineering School, Life Balance, and the Student Experience**

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Students who pursue engineering undergraduate degrees at Science, Technology, Engineering and Math-intensive (STEM) institutions experience imbalance unlike most other undergraduates in co-educational institutions. Students tend to be highly academically oriented if they plan to graduate in four years, leaving little opportunity to vary from the prescribed path. High credit loads often range from sixteen to twenty-two hours and course content is both technical and challenging.

As part of the Academic Pathways Study (APS) component of the Center for the Advancement of Engineering Education, results presented in this paper explore the role of life balance in satisfaction and persistence of engineering students.

### **Implications of Findings**

Given the widespread and repeated calls to expand the ranks of engineers in the United States, it is important for engineering education to pay attention to research findings that suggest trouble spots. Our data indicate that "Mountain Technical Institute" (MT) students desire greater balance than their academic environment will allow. Other institutions must examine their own cultures to determine if these findings are applicable to engineering colleges as a whole. If engineering wants to recruit and retain a larger population, it must find ways to expand its offerings and climate conditions for students who could be interested in engineering if the environment met their interests and needs.

### **Method and Background**

A mixed-methods approach was used in this analysis and included four items from online survey data, ethnographic interviews, and examination of academic records. This paper presents analysis and findings of data for students in their first year at MT. Nineteen females and twenty-one males comprised the sample and were required to be a May/June 2003 high-school graduate, eighteen or older by October 1, 2003, a US citizen or permanent resident, and be enrolled in or have the intention to enroll in an ABET-accredited engineering major.

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### **What We Found**

Data from the online survey revealed that all of the surveyed students at MT reported feeling some amount of concern about keeping up with schoolwork. In particular, a majority of students

(56.4 percent) indicated frequent concern about keeping up with schoolwork. Similarly, responses to a question about feeling stressed revealed that 36 percent of the students reported feeling frequently stressed. No student reported a complete lack of worry about keeping up with schoolwork, nor did any student indicate an absence of stress. Results from the survey question asking about time to pursue non-academic activities revealed that all but one student indicated some lack of time for pursuing non-academic activities; 25 percent of students reported frequently feeling unable to pursue non-academic activities due to lack of time. And in response to the question asking if the students felt they did not have a social life, 10 percent reported feeling frequently that they did not have a social life, while another 41 percent reported occasionally feeling this way.

Interestingly, these four "balance" items from the survey are not significantly correlated with either overall satisfaction with the institution or the decision to study engineering in the coming year. Thus, this level of imbalance and stress does not appear to be directly related to persistence. However, the item regarding having a social life had a significant correlation with a change in interest in studying engineering over time, indicating that the more students felt as if they had social lives, the more likely they were to report their interest in studying engineering had increased since starting college at MT. Taken together these data suggest that those who managed to maintain a social life (a key element of balance) while also feeling overworked and stressed, are individuals who are most likely to thrive academically. Perhaps balanced students are also students with a greater interest in engineering.

APS qualitative data (e.g., interviews) indicate that MT students have a desire for more balance than their academic environment will allow. Analysis of first year data indicates that engineering studies at MT attract a certain type of student, whether male or female; women are largely happier than men in their pursuits; and women seem to work harder at maintaining balance. This analysis also indicates that maintaining balance as a STEM student isn't easy as engineering school is an imbalanced environment, given the emphasis on math and science curricula and heavy homework expectations. The problem is not unique to the MT campus as students at institutions with broader offerings report similar experiences. This lack of balance may be an inhibitor of engineering education's efforts to broaden and deepen its ranks.

As with other engineering institutions, a strong culture of difficulty exists at MT, having a powerful effect on students' experiences. One female participant noted "This school's really ridiculously hard." The perception that MT is an extremely difficult learning environment exists apart from notions about the institution's rigor. Students are proud that MT is rigorous and that they have the skills, work ethic, and intelligence to be successful in an environment of high expectations. In contrast, MT's difficulty is not a source of pride, but is rather a source of anxiety, defeat, depression, and hopelessness and all MT's students feel the effect.

MT students repeatedly described circumstances of unmanageable difficulty. A strong perception that courses are designed to "weed" students out permeates the campus, in fact, a number of campus experiences are described as "make or break." MT is not alone among STEM institutions in having the "weeder" mentality as STEM education has traditionally prided itself on a practice of getting rid of those "unworthy" of a scientific, technical, or educational pedigree. If the students were not highly internally motivated, hard working, and dedicated, the learning environment could be catastrophic. As it is, the difficulty exacts a high toll on student morale as they worry about their own performance and that of their peers. Changing pedagogic practices to

maintain rigor but tame difficulty could go far in improving students' experiences, diversity enrollment, and benefit persistence.

Furthermore, because quantitative data indicate that students who feel they "have a social life" have an increased interest in studying engineering, providing an academic environment which fosters social interaction and other forms of balance could enhance engineering students' experiences. Students describe the importance of the activities they pursue to maintain a whole self, and balance helps them be better students and happier people. Students in this study demonstrated a wide range of interests including mountain biking, soccer, swim-team, etc. and the students who spoke most passionately and repeatedly about balance possessed some of the highest GPAs in our study.

Other studies into engineering education indicate a forced narrowing of interests may be a problem for retention in engineering colleges. MT students describe experimenting with finding an appropriate mix early in their academic careers; describe various on-going efforts to keep balance, given the demands of their curricular expectations; and recognize that there are whole-life issues and career factors associated with achieving personal and professional balance (see full-text article via the link below for student quotes).

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