

Enhancing Engineering Education through Mentorship

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Abstract

Introducing a unique near-peer and reverse mentoring model for first-year engineering programs, this work enhances student success through dual-form mentoring. The approach fosters belonging, resource access, and mentor skill development. Instructors benefit from current student perspectives, enhancing teaching methods. This innovative method aims to address diversity and support underrepresented students in engineering. Preliminary results suggest positive outcomes, highlighting improved mentor-mentee relationships and knowledge sharing. This model holds potential for enhancing educational practices and promoting diversity in engineering education.

Introduction

This study introduces the innovative concept of dual-form mentoring, a blend of near-peer and reverse mentoring, designed to enhance STEM student success. While peer mentoring's positive impact on academics and social integration is established, the potential of dual-form mentoring remains largely untapped. This approach promotes interactive knowledge exchange, bridging generational gaps and fostering critical thinking [12-15].

Dual-form mentoring redefines traditional hierarchies, offering an inclusive platform for communication and participation [16,17]. Extending beyond mentoring periods, it nurtures lasting mentor-mentee relationships, contributing to prolonged personal and professional growth [18,19].

Amid these developments, the issue of Hispanic underrepresentation in STEM persists [20]. Hispanics make up a mere 8% of the STEM workforce, accompanied by disparities in STEM degree attainment [21-24]. Encouragingly, showcasing successful Hispanic STEM professionals could motivate younger generations [25].

This presentation explores dual-form mentoring's potential to uplift STEM education and inclusivity, focusing on addressing the underrepresentation of Hispanics. By analyzing existing literature and potential case studies, we illuminate the promise of dual-form mentoring in fostering a diverse and vibrant STEM landscape.

The University of Texas at El Paso (UTEP) is a Hispanic-serving institution, focusing on research areas such as health, biomedical sciences, engineering, energy, and environment [26]. The Engineering Innovation & Leadership major (E-Lead) includes E-Lead 1301, where dual-form mentoring was implemented.

Dual-Form Mentoring Model: Near-peer mentoring combined with reverse mentorship was employed. Near-peer mentors were upper-level students selected based on academic success, time management, communication skills, and leadership potential. Professors approved the selection. Senior mentors, graduate or senior undergraduate students, conducted workshops for mental health and personal development.

Implementation: Pre-semester workshops prepared near-peer mentors. Weekly instructor-led meetings discussed challenges, upcoming material, and personal concerns. Bi-weekly instructor meetings assessed progress and insights. New near-peer mentors were identified for future cohorts. End-of-semester surveys evaluated course effectiveness and near-peer mentorship approach.

Evaluation: End-of-semester surveys assessed communication skills, time management, mental health, and near-peer mentorship effectiveness, covering elements like trust, role model identity, coursework assistance, and relationship dynamics.

Results & Discussion

Implementation of the dual-form mentoring approach over two semesters demonstrates its success. All stakeholders have benefited from this innovation.

Student Results: Students responded positively to near-peer mentors, rating mentoring quality as very good (37.5%) or extremely good (52.8%). Around 90% felt more confident, and 80% recognized mentors' help in constructive feedback and accessing resources. The sense of belonging increased after the course (84%) compared to before (62%).

Near-Peer Mentoring: Near-peer mentors thrive in a supportive environment, gaining insights and building confidence. The experience readies them for their careers while benefiting from well-being strategies.

Reverse Role Mentoring: Instructors embraced diverse perspectives, improving understanding of students' challenges. Instances, like adapting social media platforms, showcase the effectiveness of reverse mentoring.

Challenges: Time management and grading presented challenges, addressed through guidance and support.

Conclusion: Research validates dual-form mentoring's benefits, evident through student feedback and mentor growth. Adaptations are necessary to address challenges. This approach holds promise for personal and academic advancement in higher education.

Future Directions

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