



The UTEP Edge: A Student Success Initiative for Developing High-impact Practices

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Mike Pitcher is the Director of Academic Technologies at the University of Texas at El Paso. He has had experience in learning in both a traditional university program as well as the new online learning model, which he utilizes in his current position consulting with faculty about the design of new learning experiences. His experience in technology and teaching started in 1993 as a student lab technician and has continued to expand and grow over the years, both technically as well as pedagogically. Currently he works in one of the most technically outstanding buildings in the region where he provides support to students, faculty, and staff in implementing technology inside and outside the classroom, researching new engineering education strategies as well as the technologies to support the 21st century classroom (online and face to face). He also has assisted both the campus as well as the local community in developing technology programs that highlight student skills development in ways that engage and attract individuals towards STEAM and STEM fields by showcasing how those skills impact the current project in real-world ways that people can understand and be involved in. As part of a university that is focused on supporting the 21st century student demographic he continues to innovate and research on how we can design new methods of learning to educate both our students and communities on how STEM and STEAM make up a large part of that vision and our future.

Celena Arreola, American Society for Engineering Education

Celena Arreola graduated on May 13, 2017 with Bachelors of Science in Engineering Leadership at the University of Texas at El Paso with a concentration in Mathematics and Civil Engineering. Currently she is pursuing an M.S. in Engineering and is due to graduate in May 2019. She has been actively involved within the Department of Engineering Education & Leadership as a recruitment leader and administrative assistant. Currently she serves as the graduate advisor for the American Society for Engineering Education student chapter and is a research team leader in the Center for Research in Engineering and Technology Education where she focuses on the success of students in science, technology, engineering and mathematics of two post-secondary educational institutions based in El Paso.

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Helen Geller is the Program Manager for the STEMGROW grant, funded by the Department of Education at the University of Texas at El Paso.

Ms. Diane Elisa Golding, University of Texas, El Paso

Diane is a passionate educator and proponent for K-12 engineering education and the education of future teachers. She is a professor in the College of Education at the University of Texas at El Paso (UTEP). She earned her undergraduate and graduate degrees from UTEP and is presently pursuing her doctorate at the University of Southern California (May, 2019).

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Mr. Alejandro Rodriguez, UTEP Academic Technologies



Alejandro Rodriguez is an undergraduate student at the University of Texas at El Paso currently pursuing a bachelor's degree in mechanical engineering. Alejandro has a passion for mathematics, physics, and mechanical design. As an aspiring engineer, Alejandro hopes to find a career designing and producing mechanical aviation systems for aircraft to aid in disaster relief and search and rescue efforts. In the future he plans to be a part of a team that innovates flight and develops solutions to challenges faced by modern modes of aerial transportation. Alejandro is currently a student assistant at Academic Technologies where he instructs faculty, staff and students on the use and implementation of classroom technology at the Undergraduate Learning Center at UTEP. He is also collaborating with students and staff on mentoring and skill development through the Gaia Maker Space, conducting instructional workshops, and introducing the potential and excitement of STEAM concepts, such as computer-aided design and computer programming, to further engage elementary and middle school students through meaningful project-based learning experiences.

Fernando Monroy, The University of Texas at El Paso

Fernando Monroy is currently an undergraduate student pursuing a bachelor of science in Industrial Engineering at The University of Texas at El Paso. He is very driven in redefining the industrial and manufacturing process to become more efficient and future-forward by implementing lean techniques and a multi-disciplinary approach that involves improving the dynamics and cost-effective structure throughout the supply and production chain. Fernando is currently an undergraduate Support Assistant at The Undergraduate Learning Center in UTEP; where he assists students, faculty and staff with classroom technologies and infrastructure. He also assists students and faculty with software training for 3D Printing, CAD/CAM design and Manufacturing, as well as providing mentorship and guidance for the Gaia Maker Space. Fernando is also part of Tech-E, a hands-on, Project-Based Learning program which exposes at-risk k-12 students to emerging technologies to prepare them for future STEAM careers.

Mr. Sebastian Moncayo

Work in Progress

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Abstract

The objective of this contribution is to share how, through the integration of leadership development, undergraduate engineering education is continuing to develop steadily at The University of Texas at El Paso (UTEP) [1], [2]. This development, led by the Department of Engineering Education and Leadership (EEL), aligns strongly with our University's core goals and strategic initiatives.

Growth in leadership learning across campus is occurring through several channels, which include the establishment of a university-wide UTEP *Edge* initiative [3] and institutional support for cross-disciplinary faculty through the creation and operation of the Center for Faculty Leadership and Development [4]. The UTEP *Edge* initiative highlights the value that the integration of leadership studies has in service to the institution by: (a) encouraging leadership education innovation and best practices within engineering, and (b) moving beyond to provide frameworks for leadership development for undergraduate students across all majors at UTEP. Through these avenues, engineering leadership studies are contributing to our institution's core educational paradigm change. The takeaway is that engineering leadership education reverberates with and reiterates the value and core purposes of higher education in El Paso, TX, where we are committed to "providing quality higher education to a diverse student population" [5].

Introduction

There is currently a fundamental and tumultuous change occurring in higher education, one which has not been seen since the development of land-grant colleges in the U.S. [6]. An outcome of this change, which is strongly influenced by digitization, is decreased access to excellence [2]. Concomitant with this change, institutions such as The University of Texas at El Paso (UTEP) are committed to promoting two ideals, *excellence* and *access*, by developing new programs in leadership. For example, the "sage on the stage" at learned institutions is creating greater

opportunity for the leadership professional to become “guide-on-the-side.” One outcome of this change is a move toward the democratization of educational access. Additionally, public and urban institutions that are supportive of commuter students who primarily reside at home are likely to play an increasingly important role within U.S. higher education; as such an institution, UTEP remains at the forefront of implementing changes in student-centered education.

The student success initiative reported here is being instituted at UTEP to engage, grow and support students across all colleges, divisions and departments. This includes engineering students and those pursuing the Engineering Leadership Degree, a recently pioneered undergraduate program [7]. This effort initially grew as a response to ongoing institutional assessments (see for example, CIERP, [8]) on continuous quality and improvement. The assessments are conducted through a University-wide collaboration with the Southern Association of Colleges and Schools re-accreditation, and occur over several cycles. As such, the University accepts a strict standard of accountability for institutional effectiveness as it “educates students who will be the leaders of the twenty-first century”, and aspires to be a new model for Texas higher education in a changing economic, technological, and social environment [5].

Programs such as those described by Warnick and Schmidt [9], Reeve, Evans, Sacks, Oliva-Fisher, Rottman, and Sheridan [10], and Golding et al [7] describe efforts to implement technical and professional learning in their curricular and co-curricular programming. Warnick and Schmidt [9] utilized an experimental learning approach, building upon the experiences of other engineering and technology programs focused on leadership development (to include that of our own at Brigham Young University (BYU)), to better analyze various approaches to the development of leadership competencies among engineering and technology students. Warnick and Schmidt’s [9] findings regarding the challenges of transitioning from a typical lecture-based approach to a more experiential learning approach are similar to those faced by Reeve et al., [10] at the University of Toronto, in their effort which began 15 years ago. Their persistence and vision, however, led to a successful implementation of a multidisciplinary framework, shown hereunder.

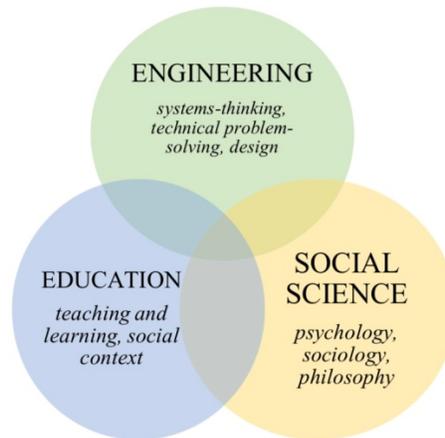


Figure 1: The University of Toronto’s multi-faceted approach to program development. From Reeve et al., [10].

Reportedly, the work at the University of Toronto continues to draw on the expertise and passions of faculty, staff and students that they see as ‘leading change to build a better world’ [10], and this thematic approach has become a central mantra to their work. Similarly, UTEP has adapted a mantra whereby it views student leadership as a critical process for students to understand in order for them to become effective agents of positive change in their own lives, the organizations they work in, and communities where they reside. Recognizing that students come to the University with varying degrees of leadership experience, UTEP is committed to their enhancement and development as future global leaders. With this insight, we view participation in student leadership activities as a core pathway to building upon existing skills while further developing perseverance, grit and personal drive.

Institutional Initiative

UTEP *Edge* was first instituted in 2017 and is based upon the following three premises: first, that students enter UTEP with many talents, great strengths, and big dreams; second, that we believe we can develop these assets through a variety of high-impact experiences (as described by Kuh, Kinzie, Buckley, Bridges, and Hayek, [11]) and Kuh [12] and third, through pursuing leadership or high-impact experiences (ranging from undergraduate research and civic engagement to study abroad and student employment) students will achieve increased confidence and enhance their personal and professional skills.

The overarching goal is to equip students with a competitive advantage when they graduate and enter the workforce or pursue a graduate degree. It is this competitive edge that distinguishes UTEP students from their peers at other institutions, and prepares our graduates for leadership and lifelong success. Further, integrating students' personal strengths and qualities with curricular and co-curricular advising will enable students to assess their level of professional development from the first year of college through graduation. The sustainability of the UTEP *Edge* depends on continued support through mentoring, advising and promoting high-impact experiences.

Students learn of the opportunities that are possible through their first-year seminary. Here students also build learning communities, comprised of cohorts of colleagues that are a support system for incoming students. The UTEP '*Edge*' initiative refers not only to those high impact student experiences gained through the university, but also to those talents that students bring with them to the university. Cross-campus, multidisciplinary faculty utilize the UTEP Edge toolkit to help students identify and embrace their own capacities and capabilities as valuable assets. This campus-wide effort is being broadly dispersed to faculty, staff and students and promotional materials have been developed and printed since the initial implementation began. The goal is for students to graduate with a "Professionally Prepared" designation. To achieve this goal, students will create portfolios based on the following criteria, as outlined in the UTEP Quality Enhancement Plan (QEP) [13]:

"Professionally Prepared" Portfolio Criteria:

- Reflections on two of the eight high-impact practices
 - Attendance at six professional preparation workshops
 - Résumé or curriculum vitae
 - Cover letter
 - *Professionally Prepared Reflective Essay*: a signature piece in the portfolio, describing how the integration of student assets with in-class, among-classes, and beyond-class experiences applies to their graduate school or employment goals.
 - Presentation of portfolio in a campus forum showcasing student achievement
- (p. 24)

UTEP *Edge* Experiences include:

- Capstone Experiences
- Community Engagement
- Creative Activities
- First-Year Experiences
- Internships
- Learning Communities
- Research and Scholarly Activities
- Student Employment
- Student Leadership
- Study Abroad/Study Away

Table 1: UTEP high-impact practices.

 FIRST-YEAR EXPERIENCE Make the most of your first year through experiences uniquely designed to support your transition to UTEP	 LEARNING COMMUNITIES Build friendships, gain academic support, and connect ideas across linked classes by joining a learning community	 COMMUNITY ENGAGEMENT Serve the community through structured academic teaching and learning opportunities	 CREATIVE ACTIVITIES Showcase your creative abilities through experiences that highlight your talents
 RESEARCH & SCHOLARLY ACTIVITIES Team-up with faculty to gain experience and make intellectual and creative contributions to your field	 STUDENT EMPLOYMENT Work on campus to develop professional experience, earn money, and enhance your résumé	 STUDENT LEADERSHIP Develop professional values by assuming leadership roles in your campus experiences	 STUDY ABROAD / STUDY AWAY Expand your horizons with international or domestic academic experiences

In addition to all of the abovementioned high-impact experiences offered to students, UTEP is developing a system across disciplines to extend accessibility beyond engineering leadership. As part of this undertaking, new courses that will professionally prepare students are presently being

identified, while college/departmental leaders are planning and designing student access portfolios that will track their *Edge* experiences throughout their college careers. Indeed, in order to be effective over the long-term, a system that tracks students' participation and success is critical. Thus, baseline metrics for formative assessment are being established, while longitudinal assessment is to be planned and undertaken by the UTEP Center for Institutional Evaluation, Research and Planning [8].

Most significant to this initiative is the development of a conceptual framework, one that teaches students to practice effective leadership and learn to lead others in the context of the future organizations they serve. This framework is being tailored by each discipline to fit the needs of their students. For instance, the framework for engineering leadership is built upon three pillars: character, competency and capacity. This framework addresses one of the biggest challenges within the university; helping students to not only understand and value the assets they bring to the university, but through self-efficacy and leadership to address and learn from contexts wherein equivocality of identity, gender and race, social, cultural diversities exist. It is with this perspective that the UTEP *Edge* initiative distinguishes itself from other leadership educational endeavors.

The end result is that all participating UTEP students will graduate with the following skills:

- Leadership – growing
- Problem-solving
- Communication
- Entrepreneurship
- Social responsibility
- Confidence
- Global awareness
- Teamwork
- Critical thinking

Our leadership education efforts further support UTEP engineering student ABET outcomes in all departments by attributing to students' professional and personal growth. When we combine their talents with our high-impact practices, students become equipped with a competitive advantage and achieve *lifelong success* in their academic, professional, and civic lives. UTEP *Edge* develops these assets through a variety of high-impact experiences that includes active participation in the ASEE Student Chapter or MAES/SHPE Joint Chapter, including the Society of Hispanic Professional Engineers (SHPE). Further, engineering education students are learning to recognize

those ‘*Edge*’ talents that they bring to UTEP and putting them into practice. One example of this, is UTEP students using their biliteracy skills to support regional K-12 students learning as they participate in the UTEP TechE program. The UTEP students become a leadership role model for these aspiring engineers, astronauts, video game designers, and perhaps, president of the United States. The power of seeing yourself in leadership roles can be all the motivation one needs to believe they can do it, too. Moreover, a majority of UTEP students live in the El Paso/Juarez sister city community and have learned to navigate two very different cultures. Students can bring an understanding and acceptance of cultural diversity and serve as exemplary ambassadors in the study abroad experience. Additionally, students at UTEP can model their time management skills and ability to juggle family life, work and classes effectively. This advantage is already seen in their approach to undergraduate research – their ability to prioritize and meet deadlines, help not only with the realization of research project goals, but set the example for students who find time management to be challenging.

The UTEP Edge design initiative is helping students identify their strengths and how to apply those strengths to further develop their leadership skills. As they participate in undergraduate research and civic engagement to study abroad and student employment, students increase confidence, enhance personal and professional skills, and help them realize the competitive advantage they have as they graduate and enter the workforce or pursue a graduate degree. Table 1 above provides a descriptive synopsis of how the high impact practices implemented across disciplines promotes student growth, knowledge and self-efficacy and transforms students into more prepared, global citizens.

The teaching and learning practices have been widely tested [14] and have been shown to be beneficial for college students from a variety of backgrounds, and most especially those historically underserved students who often do not have equitable access to high-impact learning. These practices take many different forms, depending on learner characteristics and on institutional priorities and contexts. The results of their impact are summarized by Kuh and O’Donnell [15].

One example of this high impact practice is our First-Year Seminars and Experiences (the first of Kuh and O’Donnell’s practices), which has been built into UTEP’s curriculum as a core course and given as a a first-year seminar on critical thinking. During the most recent semester (Fall

2017), 18 sections of these courses were taught within engineering alone, and several of them focused on entrepreneurship and innovation. As part of students' first university course in engineering, small groups of students and engineering faculty/staff are brought together as learning communities from which students can build long lasting supports for one another as well as faculty and staff. This is important, as Kuh and O'Donnell [15] recognize that the highest-quality first-year experiences place a strong emphasis on critical inquiry, frequent writing, information literacy, collaborative learning, and other skills that develop students' intellectual and practical competencies. First-year seminars also provide opportunities for students to ask cutting-edge questions in engineering education scholarship, and engage with faculty members' own research.

Additional high-impact practices include engineering internships and capstone design courses. The latter are included in UTEP engineering programs:

- Common Intellectual Experiences
- Learning Communities
- Writing-Intensive Courses
- Collaborative Assignments and Projects
- Undergraduate Research
- Diversity/Global Learning
- ePortfolios
- Service Learning, Community-Based Learning
- Internships
- Capstone Courses and Projects

The relationship between selected high-impact activities, deep learning, and self-reported gains is reported by the American Association of Colleges and Universities [14], as are the relationships between selected high-impact activities and clusters of effective educational practices. The results achieved at UTEP through the leadership programming is summarized in Table 2. In addition to leadership, teamwork is also grown across these domains.

Table 2: Advantages of involving engineering students in leadership learning at UTEP

			
<p>COMMUNICATION</p> <p>Reach mutual understanding through effective exchange of information, ideas, and feelings</p>	<p>CONFIDENCE</p> <p>Be self-assured through appreciating your own talents, abilities, skills, and qualities</p>	<p>CRITICAL THINKING</p> <p>Analyze and evaluate issues in order to solve problems and develop informed opinions</p>	<p>ENTREPRENEURSHIP</p> <p>Develop, organize, and manage ideas and opportunities turning them into new products, services, firms, or industries</p>
			
<p>GLOBAL AWARENESS</p> <p>Understand and appreciate people, cultures, and ideas from around the world that impact our community</p>	<p>LEADERSHIP</p> <p>Step up, think, and act critically and creatively to bring others together to accomplish a common task</p>	<p>PROBLEM SOLVING</p> <p>Find solutions to difficult or complex issues</p>	<p>SOCIAL RESPONSIBILITY</p> <p>Act ethically and responsibly for the benefit of society and the public good</p>

Outcome Measures

A data collection system to monitor students' participation in high-impact practices is part of the first-year implementation. The technologically based system will help students conserve their experiences, and faculty continues to identify and catalog coursework that integrates the high-impact experiences in the same system (which can also be accessed by student advisors). Faculty is developing the assignments and, in terms of assessment, will utilize rubric-based evaluations based on the Association of American Colleges & Universities (AAC&U). Additionally, to facilitate our assessment planning, our Center for Faculty Leadership and Development has hosted a series of workshops on *Elements of Successful Assessment Plans, Selecting Measures* [16]. These are being expanded during 2018 (see for example, UTEP Campus Edge, [17]) to include reporting and using data for curricular improvement.

At UTEP, assessment of student involvement in active learning practices is making it possible to assess the practices' contribution to students' cumulative learning. Educational research (Kuh et al, and see AACU, 2018b [18]) suggests that the high-impact practices increase rates of student retention and student engagement. However, on almost all campuses, utilization of active learning practices is unsystematic, to the detriment of student learning.

Conclusion

In summary, UTEP *Edge* is effectively a student-centered implementation of our Quality Enhancement Plan (QEP) for 2016 and beyond. It is institutionally recognized as 'the next generation of student engagement and professional preparation at UTEP. We recognize UTEP students as talented, asset rich, and ready to succeed in the classroom and their communities, and our 2016 QEP [13] will capitalize on these strengths to:

- Create programs and activities that increase student learning and professional development.
- Nurture students' recognition, development, and articulation of their assets and experiences to prepare for success in dynamic educational, professional, and civic contexts.
- Implement Integrative and Applied Learning, creating an engaged/experiential learning design as an educational model for all public urban and access universities.

Our institutionalization of these practices in a leadership-behavior centered program is thus novel. As we monitor and adjust the program's efforts, we will provide updated reports through this annual conference medium.

References

- [1] Schoephoerster, R.T. and Golding, P. (April 6-9, 2010). A New Program in Leadership Engineering, Transforming Engineering Education: Creating Interdisciplinary Skills for Complex Global Environments, Paper #1569268596, Transforming Engineering Education: Creating Interdisciplinary Skills for Complex Global Environments, 2010 IEEE Dublin, Ireland.
- [2] Golding, P., Gonzalez, R., Kendall, M., Moreno Jr., G., Schoephoerster, R., Starks, S. (2016), Bridging the Divide: Pathways to Building Engineering Education and Leadership at a Public Urban University Having a 21st Century Demographic, Union College Symposium on Engineering and Liberal Education, June 3rd, Union College, Schenectady, NY.
- [3] UTEP Edge (2018). Retrieved from: <https://www.utep.edu/faculty-development/events/UTEP-Edge.html>
- [4] Center for Faculty Leadership and Development, UTEP (2018). 4 March 2018, retrieved from: <https://www.utep.edu/faculty-development/>
- [5] UTEP Mission and Vision, retrieved from: <https://www.utep.edu/about/utep-vision-mission-and-goals.html>
- [6] Geiger, R. L. (2018) in Chapter 1 of Geiger, R. L., Geiger, Sorber, N. M., and Anderson, C. K., Editors, American Higher Education in the Postwar Era, 1945-1970. Routledge, New York.
- [7] Golding, P., Gonzalez, R., Moreno, G., Schoephoerster, R., Starks, S., and Vaughan, M. (2015), The Creation and Inauguration of Engineering Leadership, FIE. Cited at: <https://www.computer.org/csdl/proceedings/fie/2015/8454/00/07344095.pdf>
- [8] Center for Institutional Evaluation, Research and Planning (2018). Accessed 12 December 2017 at: <http://cierp2.utep.edu>
- [9] Warnick, G. and Schmidt, J. and Bowden, A. (2014). An Experiential Learning Approach to Develop Leadership Competencies in Engineering and Technology Students, 1w1st ASEE Annual Conference & Exposition, Indianapolis, June 15-18. Paper ID#8942.
- [10] Reeve, D., Evans, G., Simpson, A., Sacks, R., Oliva-Fisher, E., Rottmann, C., & Sheridan, P. K. (2015). Curricular and co-curricular leadership learning for engineering students. *Collected Essays on Learning and Teaching*, 8(1), 41-56.

- [11] Kuh, G. D., Kinzie, J., Buckley, J.A., Bridges, B.K., and Hayek J.C. (2007). Piecing Together the Student Success Puzzle: Propositions and Recommendations, ASHE Higher Education Report 32(5), San Francisco, Jossey-Bass. [6] Geiger, Roger L. (2018) in Chapter 1 of
- [12] Kuh, G. D. (2008). "High-impact educational practices: What they are, who has access to them, and why they matter." AAC&U, Washington, D.C.
- [13] UTEP Quality Enhancement Plan, 2016, cited 12 March 2018 at:
https://www.utep.edu/edge/_Files/docs/utep_2016_qep.pdf
- [14] American Association of Colleges and Universities (2018) cited at:
<https://www.aacu.org/resources/high-impact-practices>
- [15] Kuh, G. D. and O'Donnell, K. (2013). Ensuring Quality & Taking High-Impact Practices to Scale. Includes Case Studies by Sally Reed, Washington, DC: AAC&U, 2013).
- [16] Blum, T. (2017). Elements of Successful Assessment Plans. Retrieved from:
<https://campusedge.utep.edu/browse-by-unit/center-for-faculty-leadership-and-development/event/1384-elements-of-successful-assessment-plans>
- [17] UTEP Campus Edge (2018). Retrieved from: <https://campusedge.utep.edu/browse-by-unit/center-for-faculty-leadership-and-development/event/1384-elements-of-successful-assessment-plans>
- [18] American Association of Colleges and Universities (2018b), cited at:
<http://www.aacu.org/leap>
- [19] Center for Effective Teaching and Learning (2012). Retrieved from:
<https://research.utep.edu/Default.aspx?tabid=28672>