White Paper

Closing the Skills Gap in Engineering Education: A Multidimensional Perspective

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Executive Summary

This research was commissioned by Automation Alley's Research and Development Division at the request of Autodesk, Inc. Several objectives were achieved by this work:

1) Developed a comprehensive understanding of the mechanical engineering and technology talent pipeline involving two- and four-year academic institutions.

2) Provided data-driven insights that can be used by technology providers to create strategies and tactics.

3) Examined the supply and demand dynamics that are shaping two- and four-year mechanical engineering and mechanical technology educational institutions.

4) Identified areas of opportunity for strengthening collaboration between technology providers and educational institutions.

5) Enumerated recommendations that technology providers, educators, and makers can use to drive strategies and tactics.

The report provides evidence that the mechanical engineering and technology talent pipeline is failing to provide sufficient quantities of Industry 4.0 workers. In addition, recent graduates of two-year and four-year programs lack the necessary training in professional skills, such as the ability to collaborate and effectively formulate problem statements. The need to change academic programs and to provide reskilling programs for the existing workforce has become ever more urgent. Reliable data collection instruments are essential to quantify the efforts to improve the Industry 4.0 talent pipeline.

The data insights show that significant generational differences are clearly evident in terms of behaviors, motivations, and competencies. The report provides data on three critical populations in the talent pipeline: 1) next-generation engineering students; 2) next-generation skilled tradespeople; and 3) next-generation engineering leaders. The data show that differences between the generations are having profound, negative impacts. Academic programs that worked for a past generation are no longer effective, and in some cases the data shows a worsening of important soft skills. To address this problem, an insightful approach is to consider academia as a classic supply and demand ecosystem.

Academic supply and demand dynamics are being disrupted by many challenges. On the academic supply side, confusing messages are being conveyed to a shrinking pool of prospects. Inside academic programs, Industry 4.0 technology breakthroughs are outpacing academia's ability to change. On the exit side, STEM graduates and newly minted two-year technicians are frustrated by the lack of academic progress when they realize they are not prepared to immediately contribute to their new employers. With entrepreneurial thinking, these problems become opportunities.

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