Reimaging Postsecondary Education to Support the Emerging Technology Workforce

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Over the last several years, there has been a gradual decline in college enrollment and, even more troubling, a 10% reduction in community college enrollment—the most affordable and accessible access point for postsecondary education and workforce entry (National Student Clearinghouse Research Center, 2023). This is especially a problem among adult learners, who may have additional responsibilities like childcare, and underserved individuals, including communities of color (Leckrone, 2023). Enrollment decline poses a concern to the U.S. workforce and education systems because completion of a college degree is a major predictor of career success—and individuals lacking a college degree are 40% more likely to be unemployed (Marcus, 2023). The workforce landscape is rapidly shifting to meet demands in emerging technologies, such as climate management, cybersecurity, and artificial intelligence (World Economic Forum, 2023). Thus, reversing the decline of postsecondary enrollment is paramount to meeting domestic workforce needs.

Relationship Between Education and Evolving Workforce Demands

Economic conditions in which prospective students seek a rapid, successful entry into a career have compounded recent college enrollment trends. Some estimates suggest that, in addition to cost concerns, up to 80% of the recent decline in college enrollment is due to a misunderstanding among prospective students regarding the ways academic programs align with employer need and lead to positive career outcomes (The Bill & Melinda Gates Foundation, 2022). Alternatives to postsecondary education include attaining a license/certificate, completing individual courses outside of a college/university, or seeking a new position within the workforce; however, these options show the highest engagement among those who have already completed a postsecondary degree (National Center for Education Statistics, n.d.). For example, individuals possessing a bachelor's degree are more likely to obtain licenses or certificates, or engage in other types of training that support employment (e.g., internships and apprenticeships), than workers with high school diplomas. This could suggest that individuals with degrees sense that they need alternative credentials as well; colleges might interpret this as a signal that they should continue incorporating coursework directly related to emerging technologies.

STEM-focused academic programs are those that provide the most direct exposure to skills and careers pertaining to emerging technologies (Construction Placements 2023). In addition, the number of STEM undergraduate and graduate degrees awarded annually has grown steadily since 2010 (Trapani, 2022). However, this trend has not been uniform across degree types. At the associate level, STEM degree conferrals peaked in 2012, while those at the bachelor's, master's, and doctoral levels have been gradually increasing year to year. At the master's and doctoral levels, however, this increase has depended on students with temporary visas (U.S. Department of Education, 2020). Although enthusiasm for STEM programs exists, gaps remain, especially within programs that directly support entry into the workforce. Fortunately, there are several opportunities to address these gaps.

Generating Enthusiasm for Career-Focused Learning

A first approach to increasing postsecondary enrollment is generating enthusiasm for undergraduate and graduate programs relevant to a prospective student's career ambitions. At the K–12 level, such efforts have room to expand as they relate to emerging technologies. For example, just over 20% of teachers have reported discussing careers pertaining to climate technology despite almost one third of students' expressing an interest in this field (Klein, 2023). Designing classroom activities that generate career awareness, especially pertaining to emerging technologies, can help create an interest, and thus increased enrollment, in postsecondary education. For example, classroom use of augmented reality can solve real-world problems pertaining to calculus, physics, and optics (Torchia, 2022b), and this type of work will likely provide more equitable exposure to emerging career fields, ensuring a more diversified workforce (Torchia, 2022a). Further, the development of preapprenticeship programs, internships, and/or work-based learning experiences with employers in the community can support enthusiasm for career-centered learning. In support of these types of efforts, the American Institutes for Research (AIR) leads the Career and Technical Education (CTE) Research Network, a federally funded network dedicated to research, evaluation, and training in quantitative methods to support and encourage additional research. Specifically, the CTE Research Network applies the most current research toward enhancing CTE programs and student outcomes.

Connecting Postsecondary Education With Careers in Emerging Fields

To attract prospective students to postsecondary programs, such programs must provide technical exposure and training that directly translate to a career. Unfortunately, postsecondary institutions have been lagging in providing education in emerging technologies. Thus, current employment trends, indicate a need for increased workforce training and hiring in careers relating to emerging technologies, despite millions of Americans who are seeking employment (Hansen, 2021). Therefore, postsecondary programs, especially those within STEM, may need to reimagine and reassess their

approach in a way that ensures mastery of career-focused, transferrable skills. Because of the evolving nature of workforce needs, program innovations will likely require partnerships and collaboration between industry experts and stakeholders at postsecondary institutions. AIR, in partnership with the National Science Foundation, is already spearheading such alliances. Specifically, the STEM Education Core Research Hub promotes collaboration and sharing of resources among STEM educators and enhances capacities for STEM education research.

In addition to modifying instructional approaches, postsecondary institutions have opportunities to use emerging technologies as a tool to ensure academic preparedness among students entering career-focused programs. For example, skills-based assessments can determine an individual's readiness for a new education pathway. On the basis of these results, learners can receive prerequisite instruction in foundational skills and career technical education. By using artificial intelligence, colleges and universities can perform assessments and customize instruction (Mihir, 2023). Accordingly, the AIR Oral Reading Fluency Study has developed automated tools that can transcribe and score student reading and recorded audio. AIR's work has also involved approaches that improve academic readiness for education programs and subsequent careers. First, the PROMISE Center at AIR has researched workforce training strategies and improved their delivery in community colleges. Second, the ADVANCE Integrated Education and Training project deploys resources and training that support implementation of integrated education and training at various programmatic levels. Third, AIR is researching the Teaching Skills That Matter initiative, which supports the development of digital resources designed to assist with the instruction of foundational skills.

Broadening Access to Educational Paths

Creating a workforce ready to meet the demands of emerging technology will rely not only on high school graduates but on individuals already engaged in careers, including adult learners, military veterans, and/or those who have not obtained a postsecondary education. For such individuals, there may be time or financial constraints limiting their ability to engage in academic programs. Therefore, mechanisms that increase agility among learning paths will boost access to programs that support careers in emerging technologies. Implementation of several strategies can support this agility.

Increasing credit mobility provides an opportunity to ensure that all relevant work, academic, and/or military experience can count toward an individual's degree progression. Thus, the development of digital wallets, and learning and employment records, can merge such experience into accessible digital files and, in this way, can help accomplish this progression (MIT Open Learning, 2022). AIR has assisted in understanding and advancing credit mobility solutions, specifically through programs serving military veterans. Further, leveraging emerging technologies (e.g., centralized database of equivalent courses, artificial intelligence assessment of credit/skill equivalencies) can create increased efficiency in credit mobility (Black, 2017). Outside of credit mobility, cost remains a major factor in

permitting degree progression. In support of this, AIR is creating automation solutions that can [simulate student loan repayment options](#), which will inform the Department of Education regarding the economic burden of student loan debt on various student populations.

Ensuring that postsecondary institutions provide credit for on-the-job training is another strategy for broadening access to learning paths. In doing so, postsecondary institutions can serve as apprenticeship intermediaries and training providers, aligning on-the-job training with degree programs. For example, AIR is an [Apprenticeship Industry Intermediary](#) that works with postsecondary institutions and workforce development programs to support apprenticeship programs for information technology and cybersecurity jobs. AIR has also supported postsecondary institutions (e.g., Drexel University) in determining credit for on-the-job training in apprenticeships.

Embracing Changes for a Promising Future

Both postsecondary institutions and the overall workforce have an opportunity to engage in proactive changes in the advent of emerging technologies such as cybersecurity, climate management, and artificial intelligence. Although postsecondary enrollment has been experiencing some recent declines, the use of and exposure to emerging technologies in the classroom provides an opportunity to invigorate a new generation of students. Simultaneously, the domestic workforce relies on these students to engage in careers pertaining to such technologies. Further, collaboration between postsecondary institutions and industry partners will provide new opportunities capable of expanding access to learning paths for all, including the current workforce. Continued development of such approaches will help to create a skilled, diversified, and successful workforce.

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