

Interdisciplinarity and Autonomy: Keys to 21st-Century Learning in Europe

Community colleges provide a vital link between Americans and prosperity. Yet, today there is still a significant income gap in the United States. This income gap is largely perpetuated by a well-documented skills gap, which has developed due to rapid changes in technology and the inability of systems of higher education to keep up with industry transformation. The American Association of Community Colleges (AACC) described the long-standing nature of this problem: “The United States has been under-producing graduates with postsecondary skills since at least 1980, in the process contributing substantially to income inequity. Unless the nation turns this around, up to 60 million Americans are at risk of being locked into predominantly low-wage jobs that cannot support a family.”[i] Considering community colleges as the institutions best suited to propel social mobility and decrease the earnings gap, AACC identified a striking need for community colleges to better align themselves with 21st-century learning outcomes and provide more Americans with viable pathways to the middle class.

Contrary to what some may believe, 21st-century learning outcomes are not solely focused on STEM and occupation-specific “hard” skills. In fact, the skill sets most needed include “hard” and “soft” skills, or an integration of general education competencies with STEM or occupation-specific skills.[ii] The ideally prepared graduate has come to be known as the “T-Professional,” one who embodies the characteristics of depth, defined in terms of disciplinary knowledge and the ability to understand how individuals with that knowledge function and interact, and breadth, the professional abilities that allow someone with profound disciplinary knowledge to interact meaningfully with others who possess different disciplinary knowledge in order to affect an outcome that might not otherwise be possible.[iii]

International Exchange

I was fortunate to be part of an international exchange program as a graduate student in the Doctorate of Community College Leadership Program at Ferris State University, and I discovered that we can learn much from our international peers. Institutions across Europe have been experimenting with cutting-edge technologies and innovative teaching approaches that blend Career and Technical Education with outcomes

traditionally associated with a liberal arts curriculum. We were hosted by Rhein-Waal University of Applied Sciences in Cleves, Germany. We toured multiple higher education and commercial sites in Germany and the Netherlands, where I met students who were well on their way to becoming 21st-century T-Professionals.

FabLab

Rhein-Waal University has three philosophical cornerstones of its mission: Innovation, interdisciplinarity, and internationality. The university brings these together in its Fablab, a “maker space” where students learn to use modern tools to create their own projects. While its cutting-edge technologies garner much of the attention surrounding the Fablab, it is the instructional approach that truly sets this space apart. Once students have been through safety training, they are free to use the machines as they like. Consequently, a feeling of creativity and inventiveness is palpable in the FabLab.

Adriana Cabrera is a lecturer and industrial designer at the FabLab. Cabrera’s work incorporates smart biomaterials and soft prototyping, a term that refers to the making, hacking, and fabrication of projects that demand flexibility.[iv] Soft prototyping projects include not only the use of the machines, but an in-depth study of materials such as paper, textiles, biomaterials, and electronics. Cabrera’s students learn software and programming for each machine in the lab and the technical aspects of design. Her students learn to solve challenges by working independently and applying new knowledge to each assignment. She encourages students to ask themselves why they might choose each material and what effect material has on the product, its use, and the environment. While the format of assignments is demanding, Cabrera believes it is important for students to achieve small goals each week so they can see their progress. Her goal is to empower students to bring their ideas to life in a major final project.

Research supports the FabLab’s philosophy that student autonomy improves learning outcomes. A 2011 study found that autonomy produced significantly better learning results in producing deep learning outcomes, defined as a relatively permanent change in knowledge or skill produced by experience.[v] The study found that, while students who were granted higher levels of autonomy performed slightly worse than others when tested on the exact replication of an initial skill, they performed significantly better when the task required them to transfer the skill to a novel situation. In the same study, students

who were granted no autonomy during the learning process were at a loss when asked to complete a task that required them to transfer a skill or apply it in a slightly different way. Additionally, students in the autonomy groups showed markedly higher motivation for learning.

Sustainable Energy Solutions

I found a similarly innovative approach at HAN University of Applied Science, in Arnhem, Netherlands. HAN University offers a unique program that creates sustainable energy solutions for the Netherlands' future while strategically preparing students to meet the demands of tomorrow's labor force. Tinus Hammink is the Managing Director of the Sustainable Electrical Energy Centre of Expertise (SEECE) at HAN University. Hammink believes systems of higher education should emphasize creating opportunities for students to work on interdisciplinary teams. SEECE partners with employers to place students in internships that allow them to be a part of interdisciplinary, problem-solving teams. According to Hammink, the critical success factor for 21st-century challenges isn't the development of new programs, but the development of better collaboration between existing programs and stakeholders.

One company SEECE partners with is QConcepts Design an Engineering in Doetinchem, Netherlands, which develops solar electric systems. Each year, a new student team is challenged to develop a solar boat to compete in a solar boat race. Students are in charge every step of the way, from concept and design to building the actual boat, putting it in the water, and competing in the race.

Conclusion

The growing income gap between high-skilled and low-skilled workers in the U.S. shows that community colleges have a social responsibility to respond more effectively to the swiftly changing economic and social uncertainties of the 21st-century. By re-envisioning traditional teacher-driven instruction to provide increased levels of student autonomy and interdisciplinary learning experiences, we can empower our students to embrace the challenges and opportunities of tomorrow's world.

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