Preparing for the EMP

What is an educational master plan (EMP)?

"As the most long-range and comprehensive of American River College's planning processes, this plan assesses the current state of the institution, projects its likely future, and proposes how it should develop in order to serve its mission effectively. During the planning cycle, the college intentionally examines its context, environment, and effectiveness. Based on analysis of the data, the college is able to **identify key priorities** and **develop a long-term vision** for the future which can then **provide direction and serve as a navigational tool** for all other planning processes."[1]

As shown in the diagram, the educational master plan is a primary component of a fully integrated planning process. It is important to note that the EMP is guided by the framework of the Institutional Equity Plan and centered on the college's stated vision, mission, and commitment to social justice and equity.

Planning in a dynamic environment

Plans are often thought of as static documents that lay out a prescriptive, linear roadmap. In an ambiguous, complex, and constantly changing environment, a different type of planning is needed that focuses effort and resources on strategic imperatives while simultaneously creating the conditions for adaptability and innovation. This is why the EMP is described as a navigation tool at American River College. The upcoming planning process will envision the direction in which ARC will embark as it considers how to navigate towards the year 2031.

Your role

As a project team member, you will be expected to consider input collected from various college groups as well as sharing your own perspectives as we collaboratively craft the draft EMP document this fall. The process will be fast-paced, so project team members are encouraged to review this briefing packet and other resources in advance in order to prepare for active participation during team meetings.

The narrative, videos, and links are intended to provide background information on a variety of key topics and stimulate ideas that can be shared during discussions this fall. As you read through the briefs, please capture your thoughts and questions so that you are prepared to actively participate in development of the Educational Master Plan. The topics are arranged in the following categories:

- Future of Work
- Essential Skills for the Future of Work
- Learners of Tomorrow
- Future of Learning
- Higher Education Landscape

This packet is intended as a starting point as more research on these topics emerges frequently. Feel free to share other resources with the team via the Basecamp message board.

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[1] The Educational Master Plan is defined on page 10 of the ARC Integrated Planning Guide which was adopted in March 2019.

Preparing for the EMP

THE FUTURE OF WORK

Video 1: The Future of Work [What School Could Be]

"In the future, work will change but won't go away. Many types of jobs will disappear. Many workers will struggle to adjust to the disappearance of the work they understand and find it hard to thrive with work they don't understand. Wrenching transformations – which is what the future of work holds for us all – are never easy" (Cognizant, p.4).[1]

Predictions about job creation or job elimination resulting from emerging technologies are often contradictory[2]. Projections range from massive unemployment to a utopian vision of a world in which work is no longer necessary. Regardless, significant disruption as well as opportunity is expected across various types of industries and job categories.

AUTOMATION

Robotics, and particularly robotics paired with artificial intelligence, is already automating tasks done by people. However, the actual number of jobs at risk is far from clear. A 2013 Oxford study estimated 47% of jobs were at risk by 2033, while a more recent study by McKinsey & Company narrowed the estimate to 30% automation of work activities (i.e., tasks not jobs) by 2030.[3] A U.S. Government report observes

> Rather than relying on closely-tailored rules explicitly crafted by programmers, modern AI programs can learn from patterns in whatever data they encounter and develop their own rules for how to interpret new information. This means that AI can solve problems and learn with very little human input. In addition, advances in robotics are expanding machines' abilities to interact with and shape the physical world. Combined, AI and robotics will give rise to smarter machines that can perform more sophisticated functions than ever before and erode some of the advantages that humans have exercised. This will permit automation of many tasks now performed by human workers and could change the shape of the labor market and human activity. (P. 8)[4]

Experts believe that similar to the changes seen during the first industrial revolution, jobs will be both created and eliminated during the upcoming technology-driven transformation.[5] Jeff Schwartz of Deloitte Consulting observed that "it's less a question of whether robots take our jobs, and more a question of how robots and technology will change our jobs. Automation, and not just robotics, but cognitive technology and AI, natural language processing, and machine learning will take some jobs while also creating new ways of working and extended labor platforms."[6] This phenomenon is already appearing in workplaces where robots and humans are becoming co-workers, using their combined skills to produce materials and provide services. In this new reality, there is expected to be a strong need for reskilling of the existing work force as cognitive, service, and manual tasks are automated.

Video 2: How automation will disrupt the labor force [Brookings Center for Technology Innovation]

[2] Winick, E. (2018, January 25). . Every study we could find on what automation will do to jobs in one chart. MIT Technology Review.

[3] West, D. (2018, April 18). Will robots and AI take your job? The economic and political consequences of automation. Brookings Institution.

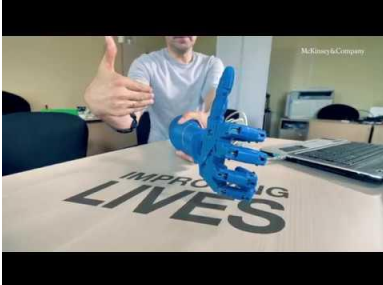[4] Executive Office of the President. (2016). Artificial Intelligence, Automation, and the Economy

[5] Manyika, J., et al. (2017, December). Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation. McKinsey Global Institute, McKinsey & Company.

[6] Schwartz, J. (2017, November 8) What's the Future of Work? Yale Insights. School of Management, Yale University.

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Video 3: Automation and the New World of Work [McKinsey & Company]

The scenarios will vary across industries as some workers are replaced, others have a portion of their tasks eliminated, others experience efficiency gains enabling new tasks to be adopted, and completely new jobs emerge. Irrespective of whether an individual needs limited retraining or an entirely new job, it is unclear how displaced employees will get the necessary help with reskilling and transitioning into different employment. According to a survey conducted by Gallup and Northeastern University, the majority of Americans believe that artificial intelligence will result in job loss; however, only 37% would look to colleges and universities for retraining.[7]

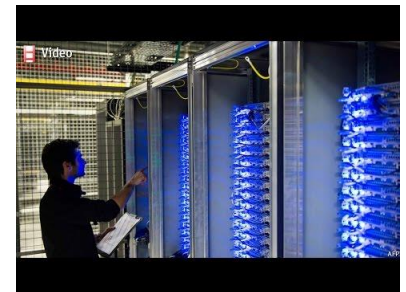## INEQUITY AND DISPLACED WORKERS

While tasks of both blue-collar and white-collar jobs are likely to be candidates for automation, there are concerns that the impacts will differ along socio-economic lines. According to a 2016 report by the Obama administration, **"research consistently finds that the jobs that are threatened by automation are highly concentrated among lower-paid, lower-skilled, and less-educated workers. This means that automation will continue to put downward pressure on demand for this group, putting downward pressure on wages and upward pressure on inequality" (p. 2).**[8] Similar conclusions can be found in 2018 analysis by Bain & Company that observes

Video 4: How Computers Threaten the Jobs of Mid Skilled Workers [The Economist]

> As automation technologies spread, we expect employment and wage growth to be concentrated in jobs that require high social and analytical skills—jobs that are already relatively highly compensated today. Workers in mid- to low-skill roles who rely on physical labor or analytical skills vulnerable to automation are at higher risk of losing their jobs or facing pressure on wages. If recent history is a guide, those who lose their jobs may face lower incomes throughout their career after being reabsorbed into the workforce, and some may choose to drop out entirely (p. 36).[9]

Educational providers could play a role in bridging this gap to foster economic mobility of impacted workers.

FLEXIBLE WORKFORCE

According to a recent report by the McKinsey Global Institute, 20-30% of the working age population are currently doing independent work in which they have a high degree autonomy, variable income, and short-term relationships with clients.[10] Much of the work is transacted across digital platforms through which an employer can access external talent and workers can sell their services.[11] For businesses, contracted labor is appealing because it controls costs while also creating a staffing model that is flexible enough to adapt quickly.[12] For individuals, the loss of certain employer-paid benefits is offset by greater flexibility and control over the work-life balance. The growth of fluid work arrangements suggests that individuals may need alternatives to employer-based professional development as well as greater entrepreneurial acumen, small business expertise, accelerated learning paths to expand skill sets, networks to connect to freelance opportunities, and portable credentials by which skill sets can be quickly verified.

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[7] Optimism and Anxiety: Views on the Impact of Artificial Intelligence and Higher Education's Response, January 2018. Gallup-Northeastern University.

[8] Executive Office of the President. (2016). Artificial Intelligence, Automation, and the Economy

[9] Harris, K. (2018). Labor 2030: The Collision of Demographics, Automation, and Inequality. Bain & Company, Inc.

[10] Manyika, J., et al. (2016, October). Independent Work: Choice, Necessity, and the Gig Economy. McKinsey Global Institute, Mckinsey & Company.

[11] Manyika, J., et al. (2016, October). Independent Work: Choice, Necessity, and the Gig Economy. McKinsey Global Institute, Mckinsey & Company.

[12] Weber, L. (2017, February 2). The End of Employees. Wall Street Journal.

Preparing for the EMP

CONSIDER AND REFLECT

SPRINGBOARD QUESTIONS

- Consider what you know about ARC. How effective do you think it will be in the future of work if it maintains the status quo?
- What are the implications for ARC and how it should navigate the future?
- How might the future of work impact students and the role of ARC as their educational provider?
- How might ARC change to respond to the need for fast reskilling and upskilling of displaced workers?
- How might ARC align with the training needs of the flexible workforce?
- How might ARC predict the new jobs that will emerge and develop training to meet the future demand?
- How might the future of work unfold among the ARC workforce?
- What considerations are there for professional development?
- What role might ARC play in responding to the inequities that are likely to occur as a result of automation?

"I think it's reasonable to expect that all of our jobs and all of our careers will be significantly or fundamentally changed by technology and different labor options. As that is happening, we have the opportunity to redesign organizations, work, and how we think about careers and learning. If you're motivated by the idea of living in fast-changing times, it's going to be pretty exciting. If you're in fear of fast-changing times, it's going to be tough."[13]

-- Jeff Schwartz, a principal at Deloitte Consulting

Want to Dig Deeper? Resources for Further Reading:

McKinsey Global Institute Report Series:
Independent Work: Choice, Necessity, and the Gig Economy (McKinsey Global Institute)
Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation (McKinsey Global Institute)
Harnessing Automation for a Future that Works (McKinsey Global Institute)
Navigating a World of Disruption (McKinsey Global Institute)
Skill Shift: Automation and the Future of the Workforce (McKinsey Global Institute)

Literature Review Prepared for Los Rios Community College District:
Literature Review: Impact of Automation and Artificial Intelligence on the Workforce
(Centers of Excellence for Labor Market Research)

Other Resources:
Workforce of the Future: The Competing Forces Shaping 2030 (PWC)
21 Jobs of the Future: A Guide to Getting – and Staying – Employed (Cognizant)
Future of Work Infographic (Gartner)
Emerging Technologies' Impact on Society & Work in 2030 (Institute for the Future)
Privacy, Security, and Digital Inequality: How Technology Experiences and Resources Vary by Socioeconomic Status, Race, and Ethnicity (Data & Society)
Labor 2030: The Collision of Demographics, Automation and Inequality (Bain)
Making Room: Reflections on Diversity and Inclusion in the Future of Work (Cognizant)
Women, Automation, and the Future of Work (Institute for Women's Policy Research)
Four Diversity and Inclusion Disruptors in the World of Work (Forbes)
Automation and the Future of the African American Workforce (McKinsey)

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[13] Schwartz, J. (2017, November 8) *What's the Future of Work?* Yale Insights. School of Management, Yale University.
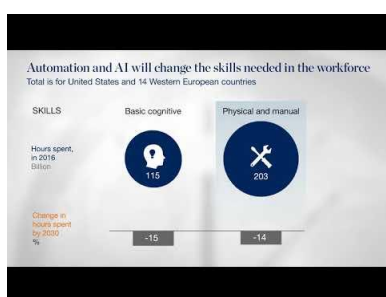
Essential Skills for the Future of Work

"…workers will need different skills to thrive in the workplace of the future. Demand for social and emotional skills such as communication and empathy will grow almost as fast as demand for many advanced technological skills. Demand for basic digital skills has been increasing in all jobs. Automation will also spur growth in the need for higher-level cognitive skills, particularly critical thinking, creativity, and complex information processing. Demand for physical and manual skills will decline." (McKinsey Global Institute, p. 8)[14]

Video 5: How demand for workforce skills will change with automation: A minute with MGI (McKinsey Global Institute)

While there are a vast array of predictions about which jobs will survive technological progress, there is remarkable consensus on the skills that will be needed. A study co-authored by Yale labor economist Lisa Kahn and Harvard professor David Deming indicates that workers who have a strong combination of cognitive and social interaction skills will be well prepared for a world of automation and sought after by employers.[15] A recent report from the National Academies of Sciences, Engineering, and Medicine extends this idea by stating "as IT continues to complement or substitute for many work tasks, workers will require skills that increasingly emphasize creativity, adaptability, and interpersonal skills over routine information processing and manual tasks. The education system will need to adapt to prepare individuals for the changing labor market (p. 140)."[16] Joseph Aoun, president of Northeastern University, echoes this research by suggesting that innately human skills (innovation, creativity, empathy, entrepreneurism, and cultural agility) must be teamed with technical and data literacy[17]. In short, those who have the ability to work alongside machines to leverage automation while also bringing the human ability to create and interact will be well prepared to navigate jobs in the near future.

Many of the desired skills are those that individuals acquire through a liberal education; yet it is no longer a question of technical education or liberal education: it must be both. The Academy of Arts and Sciences recently noted that

> College graduates in every field need to master a blend of so-called soft and hard skills, technical training as well as socio-emotional, problem-solving, and critical thinking skills, so they can perform effectively at work, participate meaningfully in community and civic affairs, and pursue learning throughout their lifetimes. Vocational training focused on narrow job-related skills helps students find jobs when they are young, research finds, but they are often not prepared to adapt to changes over time and thus are more likely to be unemployed or have lower salaries when older compared to those who received a more academic general education … every program should strive to combine the skills of a liberal education with technical and practical skills for a firm foundation to promote greater social and economic mobility over a lifetime" (p.10).[18]

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[14] Navigating a World of Disruption, Briefing Note Prepared for the World Economic Forum in Davos, Switzerland, January 2019. McKinsey Global Institute, McKinsey & Company.

[15] Kahn, L. (2017, June 21). Demand for Social and Cognitive Skills is Linked to Higher Firm Productivity. Yale Insights. School of Management, Yale University.

[16] National Academies of Sciences, Engineering, and Medicine. (2017). *Information Technology and the U.S. Workforce: Where Are We and Where Do We Go from Here?* Washington, DC: The National Academies Press. doi:10.17226/24649

[17] Ashford, E. (2018, May 1). Colleges Should Educate Students to Be 'Robot-Proof'. Community College Daily.

[18] Commission on the Future of Undergraduate Education. (2017). The Future of Undergraduate Education: The Future of America. American Academy of Arts & Sciences.

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This idea was echoed by Scott Hartley, a venture capitalist from outside academia, who wrote in a 2017 Techonomy article:

> The answer to this challenge might be our least intuitive yet: at the moment of technological inflection, we need to double down on the liberal arts. After all, this is where students are exposed to broad ideas and challenged to grapple with the humanities, arts, and social and natural sciences in settings designed to tug on our minds, question our assumptions, and refine our curiosity. The liberal arts are not at odds with technical literacy. They are what give us the context with which we apply the new tools and our very human comparative advantage, even in a world in which machines continue to get smarter and smarter.[19]

The key findings of research by the Strada Institute for the Future of Work (see box at right) reinforce this thinking. They also suggest that workers will seek out some form of postsecondary education repeatedly throughout their lifespan but depict the experience as developing a mixture of human and technical skills.[20]

Tomorrow's workforce will also need the capacity to operate with, or without, traditional employment arrangements. According to the McKinsey Global Institute,

> Each independent worker is essentially a self-contained small business—and running that business may demand new skills that are not in their natural wheelhouse. The challenge of constantly landing new business requires marketing savvy, for instance. It is also important for independent workers to consider diversifying their income streams so they are not totally reliant on one client who can cut them loose at any time. It takes administrative skill and foresight to prepare for peaks and valleys in earnings, to perform all tax and legal compliance, and to manage accounting."[21] (p. 96).

The third area in which preparation is likely to be needed is for jobs to support development and deployment of emerging technologies. One report suggests as many as 50 million new technology jobs may be required by 2030.[22] For profit online education providers have demonstrated an ability to keep pace with the evolving technology marketplace in a manner that can often be challenging for more traditional higher education institutions. While advanced technology skills are expected to be in highest demand, almost all workers will need some level of technology proficiency.[23] As the wealth of new technologies grows, it is likely that there will also be a need for constant reskilling of incumbent employees who were previously trained in technologies that are becoming obsolete.

Key Findings

+ Human skills, like leadership, communication, and problem solving, are among the most in-demand skills in the labor market.

+ Human skills are applied differently across career fields and must be effectively translated in terms of their relevance and application within a given field.

+ Liberal arts majors can break down barriers to entry through better identification and understanding of their human skills and the addition of targeted technical skills. There is a discernible labor market demand for agile and resilient thinkers who have a handle on digital literacies—basic technical skills like data analysis and digital fluency.

+ Liberal arts graduates' marketplace outcomes are positive but less predictable than those of their STEM peers.

Robot-Ready: Human+ Skills for the Future of Work

Image Source 1: Strada Institute for the Future of Work (Robot Ready: Human+ Skills for the Future of Work)

[19] Hartley, S. (2017, April 9). Robots Want Your Tasks, Not Your Jobs (or Why the Liberal Arts Still Matter). Techonomy.

[20] Welse, M., Hanson, A., Sentz, R., and Saleh, Y. (2018). Robot Ready: Human+ Skills for the Future of Work. Strada Institute for the Future of Work.

[21] Manyika, J., et al. (2016, October). Independent Work: Choice, Necessity, and the Gig Economy. McKinsey Global Institute, McKinsey & Company.

[22] Manyika, J., et al. (2017, December). Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation. McKinsey Global Institute, McKinsey & Company.

[23] Bughlin, J., et al. (2018, May). Skill Shift: Automation and the Future of the Workforce. McKinsey Global Institute, McKinsey & Company.

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Food for Thought: This McKinsey Global Institute infographic predicts how workforce skills will shift in the future.
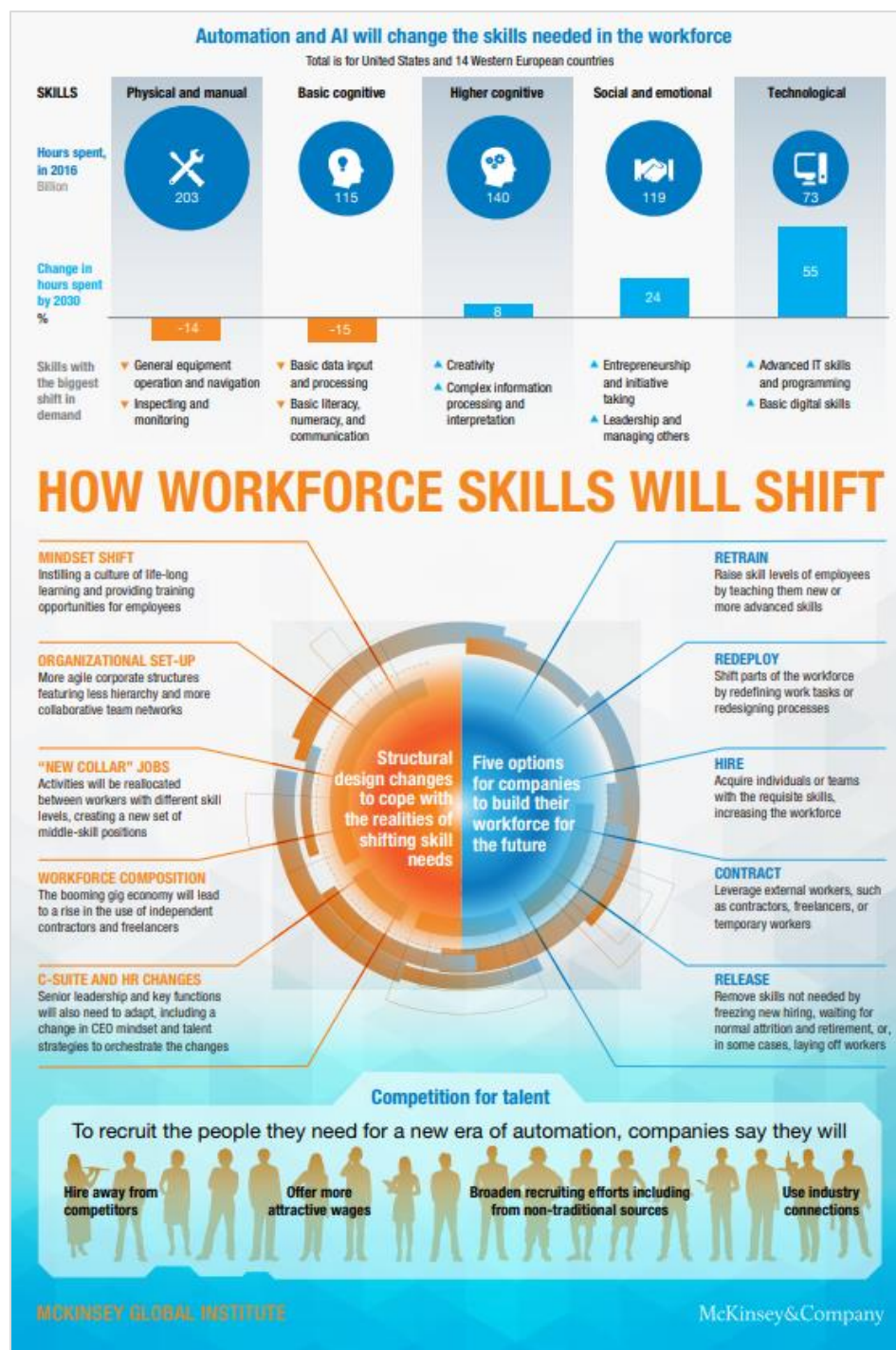

Image Source 2: McKinsey Global Institute (Skill Shift: Automation and the Future of the Workplace)

For more information, read the full report: Skill Shift: Automation and the Future of the Workforce

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CONSIDER AND REFLECT

SPRINGBOARD QUESTIONS

- Consider what you know about ARC. If it maintains the status quo, how effective do you think it will be in infusing learners, employees, and the broader community with the essential skills?
- What are the implications for ARC and how it should navigate the future?
- Which priorities should ARC pursue to ensure that future learners are equipped with the essential skills?
- How might liberal education be packaged, embedded, or promoted in new ways to reach students who are seeking short-term educational opportunities?
- How might students be prepared for non-traditional work arrangements?
- Which technology skills (technical as well as digital fluency) will be most sought after by future students and employers?
- Which essential skills is the college workforce likely to need and how will they be attained?

"The skills needed now and for the future combine the technical with the human: programming + ethics, artificial intelligence (AI) + emotional intelligence, or logic + values or judgment. While employers are scrambling for this new talent, postsecondary education is falling behind. In spite of all the trends and forces reshaping the world of work, few colleges or universities are redesigning their educational models to keep pace with the future.

-- Excerpt from Robot Ready: Human+ Skills for the Future of Work (Strada Institute for the Future of Work)

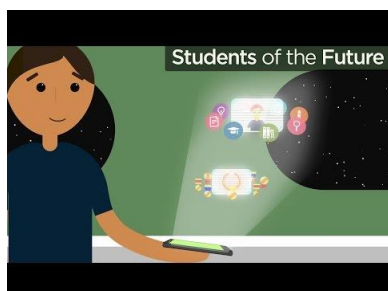*Want to Dig Deeper? Resources for Further Reading:*

Skill Shift: Automation and the Future of the Workforce (McKinsey Global Institute)
Robot Ready: Human+ Skills for the Future of Work (Strada Institute for the Future of Work)
Future of Undergraduate Education (American Academy of Sciences)
Colleges Should Educate Students to Be 'Robot-Proof' (Community College Daily)
Demand for Social and Cognitive Skills is Linked to Higher Firm Productivity
Preparing for the Future of the Workforce (Community College Daily)
Is Collaborative Problem Solving the Key Skill for the 4th Industrial Revolution? (Forbes)

Learners of Tomorrow

Video 6: Students of the Future [Educause]

As ARC approaches the year 2031, it is likely that the student population will be very different from what it has traditionally been. There are multiple factors that will contribute to this change including regional demographics, participation in the CVC-OEI Exchange, digital proficiency, workforce trends, and nationwide shifts towards a lifetime of learning.

REGIONAL CHANGES

Los Rios conducted an environmental scan in 2016 that indicated that the population in the LRCCD Tri-County service area is growing and becoming more racially/ethnically diverse. Across the ARC service area, the highest levels of overall population growth are projected to be in North Natomas and North Highlands. The total number of high school graduates in the Los Rios tri-county service area is expected to remain relatively stable through 2027-28[24]. As shown in the regional snapshot, substantial shifts are expected in the Hispanic/Latino and White populations. California projections to 2030 show an ongoing need for college graduates, but when broken down by supply and demand, it also appears that there will be an overabundance of individuals who have some college but no degree.[25]

> **Regional Snapshot:**
>
> **The population in the LRCCD Tri-County service area is growing and becoming more racially/ethnically diverse.**
>
> Projected Population Growth (2010-2030): **20.5%**
>
> Highest anticipated growth areas within ARC's college service area (2008-2035):
>
> North Natomas: **64.7%**
>
> North Highlands: **49.0%**
>
> Proportion of Population by Race/Ethnicity:
>
> | | 2010 | 2030 |
> |---|---|---|
> | African American | 5.9% | **5.3%** |
> | Asian | 13.3% | **14.3%** |
> | Hispanic-Latino | 37.7% | **43.0%** |
> | Multi-Race | 2.5% | **3.3%** |
> | White | 40.3% | **33.6%** |
>
> *All data excerpted from the Los Rios 2016 Environmental Scan of Greater Sacramento*

THE CVC-OEI EXCHANGE

Traditionally, online education within Los Rios was primarily offered to and accessed by individuals within the local region. In 2018, the Los Rios colleges became members of the CVC-OEI consortium and agreed to be among the pilot schools for the CVC-OEI Exchange. Through the Exchange, Los Rios courses are offered to students throughout the state who can easily enroll without the typical Los Rios application and registration process. As the "teaching college", Los Rios instructors are likely to find that the composition of students in the virtual classroom is more reflective of the state, rather than the local region. Demographic comparisons can be found in the 2016 environmental scan, but generally the state tends to be more diverse than the region.

DIGITAL PROFICIENCY

Exiting high school students and young professionals are digital natives who are accustomed to accessing information and connecting with others through their devices. This proficiency influences their choice of learning providers, learning preferences, and expectations for the learning experience (e.g., "mobile first" design). It also creates potential digital divides in the classroom based on generation (exposure to technology) and socio-economic status (access to technology).

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[24] California Public K-12 Graded Enrollment and High School Graduate Projections by County, 2018 Series. State of California Department of Finance.
[25] California is facing a shortfall of college-educated workers. Public Policy Institute of California. (2019, January)

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WORKFORCE TRENDS

Colleges were historically designed to prepare individuals for a single career that would span decades, often with one employer. The reality is now very different with individuals following divergent career paths, working for multiple employers either simultaneously or over the course of a career, and possibly engaging in independent work on a contracted or freelance basis. The demographics of the workforce are also changing with 20% of people at or beyond age 65 continuing to work in regular jobs rather than opting for retirement.[26] The shelf life of knowledge is becoming shorter and reskilling of the workforce is becoming necessary across various stages of life.

Video 7: Navigating the Future of Work (Deloitte)

These trends indicate that the students of the future will be more diverse in age, life experiences, and educational goals. A need for continuous, on-demand learning may overtake the concept of completion and alternate forms of training may be necessary to provide learners with access to educational content in a time- and geographically-neutral environment (anytime, anyplace). Author Jeffrey Selingo suggests "the purpose and structure of higher education will need to shift to keep pace with changes in the workforce. Instead of the industrial model of education, where students follow a prescribed curricula delivered largely in formal classroom settings, higher education in the future will need to equip students with collaborative, problem-solving skills to self-direct their own learning for life in way that allows them to complement rather than try to compete with technology."[27]

CONSIDER AND REFLECT

SPRINGBOARD QUESTIONS

- Consider what you know about ARC. How effective do you think it will be in serving learners of tomorrow if it maintains the status quo?
- What are the implications for ARC and how it should navigate the future?
- What are the effects and opportunities of participation in the OEI Exchange in terms of the student population and learner needs?
- Why are students seeking non-traditional learning? How might ARC evolve to meet those needs?
- If lifelong, continuous learning is becoming commonplace, how will the demographics of the student population change? What implications does that have for instruction, curriculum, services, facilities, student life, and other aspects?
- How might ARC respond to the expected shifts in the regional population?

"Universities should strive to do more than simply offer the new-style programs and credentials that 21st-century lifelong learners need to stay current. We should capitalize on the life-changing relationships we form with our undergraduate students and continue them after they leave our campuses. We should promise such a relationship to any learner who joins our university family at any stage of their life and career."[28]

-- Chris Dellarocas, associate provost for digital learning and innovation at Boston University

Further Reading

Competitive advantage with a human dimension: From lifelong learning to lifelong employability (McKinsey & Company)

From Educational Institutions to Learning Flows (Institute for the Future)

Future of College Education: Students for life, computer advisers, and campuses everywhere (Washington Post)

The 2016 External Environmental Scan of the Greater Sacramento Area (Los Rios CCD, Office of Institutional Research)

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[26] Selingo, J. (n.d.) The Future of Work and What It Means to Higher Education, Part I: Automation and a Gig Economy. Workday.
[27] Selingo, J. (n.d.) The Future of Work and What It Means for Higher Education, Part One. Workday.
[28] Dellarocas, C. (2018, August 1). Higher Education in a World Where Students Never Graduate. Inside Higher Ed.

Future of Learning

Not only does the pace of technological change continue to escalate, but day-to-day life is increasingly immersed with technologies. These advancements have significant implications for higher education --- for internal college operations and well as how colleges interact with students to enable learning and meet student expectations. Looking to the horizon, there is little consensus on what the future may hold for higher education. Below is a sampling of recent predictions to ponder:

"Education will become more personal and more engaging. Artificial intelligence and virtual reality will be used in digital learning. Adaptive competency-based education will allow students to move quickly through content they already know. Personalized curriculum will meet student needs, and faculty will become learning facilitators helping students at their level of learning. Business intelligence and predictive analytics are giving us a lot more information about our students than we've had. Technology will allow us to track other forms of learning such as certifications and badges that are currently not part of the official education system. New record keeping technology will let students provide employers with all their training experiences whether it is formal or informal. Traditional educational providers are going to have to figure out how to remain competitive in this new world with non-traditional providers."[29]

-- Pam Quinn, Provost, LeCroy Center, Dallas County Community College District

"The role of the teacher will gradually become the high-value-added role of tutor and facilitator, assisted by algorithms and tools that use artificial intelligence and big data. These tools could replace the teacher in answering routine questions from students, freeing professors to work with students on areas that only a human can address. Chatbots could take on part of the role of the tutorial supervisor. An instructor at Georgia Tech tried this recently. Professor Ashok Goel created a bot teaching assistant that was tasked with answering students' questions. Surprisingly, the students did not even realize they were interacting with a chatbox."[30]

-- Eric Hazan, Senior Partner, McKinsey & Company

"In spite of their growing use, digital assistants only scratch the surface of the coming changes. Colleges and universities are challenged to move beyond the use of technology to deliver *education. Higher education leaders must consider how AI, big data, analytics, robotics, and wide-scale collaboration might change the* substance *of education. The world around us is getting smarter. What does it mean to be a professional in a world of smart machines?"[31]*

-- Diana Oblinger, President Emeritus of Educause

"Learners will require convenient and continuous access to a much broader digital learning environment that connects formal with informal learning options across space, time, and multiple spheres of influence - from structured degree and certificate programs, to stackable credentials, to customized training courses, to personal resources. That will mean moving beyond conventional course delivery to create a student-centric learning model, grounded in a dynamic virtual experience. Course delivery of the future will be far more active and authentic, customized and connected. Consequently, we will need to focus more on technology's experiential value as a robust learning enhancement rather than on its transactional value as an expedient to education access and delivery. To accomplish that goal, we will be forced to create next-generation learning environments that optimize the virtual cornucopia of evidence-based, digital learning tools and applications at our disposal – from virtual and augmented reality, to gamification, robotic telepresence and artificial intelligence."[32]

-- President of Drexel University, Susan Aldridge

[29] Future Forward: The Next Twenty Years of Higher Education. Blackboard. (2017).

[30] Hazan, E. (2017, July 17). Reinventing Schools for the Digital Age. McKinsey & Company.

[31] Oblinger, D. (2018, August 27). Smart Machines and Human Expertise: Challenges for Higher Education. EducauseReview.

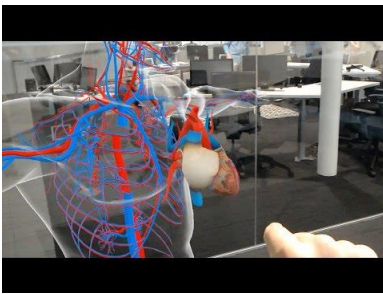[32] Future Forward: The Next Twenty Years of Higher Education. Blackboard, 2017.

Preparing for the EMP

The one thing these predictions have in common is an expectation of disruptive change. Institutions must consider how quickly that change might emerge, where opportunities exist, and how to best traverse the evolving environment. The following discussion is intended to provide an overview of some of the technological and non-technological factors that are influencing higher education institutions and highlight examples from early adopters.

VIRTUAL/AUGMENTED REALITY AND IMMERSIVE LEARNING

Video 8: Transforming Medical Education with Microsoft HoloLens [Case Western Reserve University]

Virtual reality provides an alternative experience while augmented (mixed) reality blends the real and virtual worlds into a seamless, interactive experience. These technologies have particular relevance for experiential learning and are already in use in higher education, military, and corporate training settings. Consider the potential effectiveness of hands-on learning experiences that use technology to not only transfer knowledge, but to immerse students in the context in which the knowledge would be used. Perhaps it could be learning Spanish language and culture while virtually exploring Costa Rica, studying history on site at a virtual archeological dig, or learning public safety protocols in the midst of a virtual emergency crisis.

Case Western Reserve University is using Microsoft Hololens, a mixed reality technology, to teach anatomy in a three-dimensional visual format that goes far beyond a textbook approach. Japan Airlines adopted the same technology to help individuals understand how jet engines work and to provide training to their engine mechanics and flight crew.[33]

Virtual and augmented reality is also being piloted in multiple programs in the California State University system including applications for students in nursing, teaching, science, and journalism classes. According to a 2018 article, CSU faculty are quickly adopting the technology in hopes of improving student engagement and learning[34]. Through its initiative branded as VITaL (Virtual Immersive Teaching and Learning), San Diego State University has created an incubator space for instructors to experiment with these technologies. Details of the VITaL initiative

Video 9: Virtual Teaching and Learning - VITaL at SDSU [San Diego State University]

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[33] Moscaritolo, A. (2016, July 11). Japan Airlines Using Microsoft Hololens for Training. PCMag.
[34] Marcos, A. (2018, February 1). How Immersive Technology is Changing the Way CSU Students Learn.. CSU News.

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ARTIFICIAL INTELLIGENCE

While artificial intelligence is reshaping the workforce, it also has potential uses throughout higher education. A 2018 report from Learning House contends that "as artificial intelligence (AI) becomes more effective and machine learning becomes increasingly capable of internalizing complex concerns, we approach an age where faculty and staff can be relieved of many labor-intensive, but ultimately rote, tasks. Innovators in the marketplace are already beginning to tackle that challenge and … AI solutions exist in the market that free up brainpower and time, allowing us to pursue a rigorous, adaptive and personalized experience for students"(p.5).[35] It seems likely that colleges of the future may see artificial intelligence, as well as the intersection of human and AI robotics, in the classroom and around campus as a means to facilitate a 24/7 learning environment. In 2018 SNHU President LeBlanc predicted

> AI will radically alter the way we do our work. This will probably happen first in administrative functions, such as guiding students through processes for financial aid, course registration, and career pathways. It will increasingly be deployed as an aide, from help desk to tutoring. It will make possible individualized learning pathways and adaptive learning and will erase the difference between formative and summative evaluation. AI will be the engine behind immersive learning and will be inextricably linked to the use of data. It is likely to be preferred over human interactions in many instances, since those in Generation Z will grow up completely comfortable with human-machine collaboration. Siri and Alexa will join a circle of friends and professionals, there whenever needed."[36]

A recent report from Learning House indicates it is indeed happening with multiple universities (Saint Louis, Northeastern, Arizona State) experimenting with Alexa on campus.[37] Artificial intelligence is also appearing in the classroom environment. At Rensselaer Polytechnic Institute, virtual reality merges with AI as students practice their skills at speaking Mandarin to animated AI characters. More information about the technology behind this learning experience is described in the IBM Blog about the Mandarin Project. Separate experiments at the University of St. Thomas in Minnesota and Stanford University are exploring another classroom application which is the use of AI, along with other technologies such as facial recognition, to gauge student engagement and discern emotional response.[38] AI is also making it easier for institutions to improve accessibility and reduce liability. The Dallas County Community College system is using IBM Watson AI to automate captioning of videos without relying on human transcription.

Video 10: How AI helps students learn Mandarin at RPI [Rensselaer Polytechnic Institute]

Beyond the classroom, AI is facilitating information provision and services such as answering commonly asked prospective student questions, scheduling appointments, and other routine tasks. One strategy employed by institutions is to use these technologies as a first point of contact and route more complicated inquiries to human specialists. Pounce, an AI-powered assistant launched at Georgia Tech, answered the vast majority of the 50,000+ questions asked by incoming students, leaving less than 1% to be handled by university employees.[39] A recent experiment at MIT is using AI to connect current students to alumni mentors across social networks to provide practical feedback on their coding skills.[40]

[35] Klutka, J., et al. (2018, November). Artificial Intelligence in Higher Education: Current Uses and Future Applications. Learning House.
[36] LeBlanc, Paul. (2018, July 2). Reading Signals from the Future: Educause in 2038. Educause Review.
[37] Klutka, J., et al. (2018, November). Artificial Intelligence in Higher Education: Current Uses and Future Applications. Learning House.
[38] Lieberman, M. (2018, February 20). I know how you felt this semester. Inside Higher Ed.
[39] Klutka, J., et al. (2018, November). Artificial Intelligence in Higher Education: Current Uses and Future Applications. Learning House.
[40] McKenzie, L. (2018, September 26). Pushing the Boundaries of Learning with AI. Inside Higher Ed.

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INTERNET OF THINGS/PERSONALIZED LEARNING

Data is being created constantly - sometimes through obvious data collection, but more frequently collected discreetly through the sensors of the Internet of Things (IoT) which consists of a massive interconnected network of devices, vehicles, appliances, and other products. The IoT has potential to automate, adapt, and personalize the entire learning experience. On campus, it might be used to provide location-specific information or automatically adjust classroom equipment settings based on instructor preferences. It might tailor content or inform interventions based on a student's interactions, learning style, personal schedule, or other factors derived from connected data. Paul LeBlanc, President of Southern New Hampshire University observes, "This is happening first in areas of fitness and health … It is not an enormous leap to think about connected learners, especially as we discover more about the intersection of learning with physical and cognitive dynamics. Connected learners are likely to send data on simpler things: Are they getting enough sleep? Are they anxious? Are they getting enough exercise?[41]"

> **Excerpt from an interview with Itai Asseo, Strategic Innovation Executive at Salesforce:**
>
> *"A great example of how the IoT is playing out in the real world today—an example that is applicable to higher education institutions—lies not in Silicon Valley but in Orlando, Florida. Disney World's MagicBand is a wearable device that transforms the entertainment experience into a much more personalized affair …. What might a MagicBand look like in higher education? For students the academic experience becomes seamless, simple, and streamlined, with easy access to fitness/recreation facilities, academic buildings, residence halls, and athletic events and with simplified attendance, library access and lending, and payment at the cafeteria, bookstore, copiers, and more. Yet the real power comes into play for administrators and faculty. By leveraging the data of students' interaction with the campus at all times, higher education institutions can become more effective and productive as a result of mashing together different data points, such as attendance and performance, and can become more proactive, even more predictive, rather than reactive."*
>
> *Read the full Educause article, The Internet of Things: Riding the Wave of Higher Education.*

Video 11: Introducing PAL3, Lifelong Learning Assistant [USC]

Personalized, adaptive learning becomes possible as technology offers an avenue for meeting the individualized just in-time needs of learners. An early example used with the U.S. Navy was developed at the University of Southern California which created a virtual learning facilitator, the PAL3 lifelong learning guide. Many institutions are already exploring or designing personalized learning platforms including Western Governors University, Southern New Hampshire University, National University, and a consortium of institutions including Arizona State University.[42] Mark Lieberman, a journalist for Inside Higher Ed writes

> The race is on for the latest, greatest tech-enabled, online, personalized, competency-based and adaptive/analytic postsecondary education model….The technology and emerging learning strategies exist to create "student-of-one" or individualized programs. Rather than students enrolling in a set program with a prescribed list of courses and schedule, a student-of-one program would instead be built around an individual learner. He or she *is* the program; they complete a customized path that sequences personalized, adaptive modules -- both career-specific modules and general professional competency modules (communication, critical thinking, etc.) -- and projects that match their learning profile and lead toward a career goal and/or job placement. Students complete these modules and projects at their own pace, in between working and raising families if necessary. And they need not be isolated. They might be regularly connected (virtually or in person) with other students-of-one on similar career paths to share and review work."[43]

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[41] LeBlanc, P. (2018, July 2). Reading Signals from the Future: EDUCAUSE in 2038. Educause.
[42] Lieberman, Mark. (2017, August 16). "National University's Ambitious Personalized Learning Experiment." Inside Higher Ed.
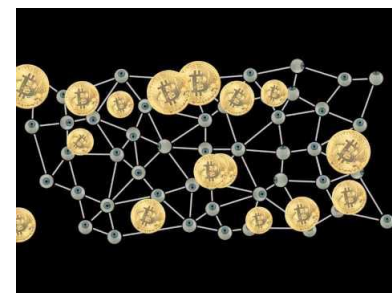[43] Ibid.

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BLOCKCHAIN

What if transcripts were no longer institution-specific, but a student-specific recording of all learning across all institutions and other experiences? What if the official version was owned by the student, digital and accessible without any cost and degrees could be immediately verified by transfer universities and employers with a simple click? Blockchain, the technology that powers Bitcoin transactions, is making it possible. Rather than issuing a document or transferring electronic data (i.e., e-transcript) from one institution to the next, there is instead a verifiable, digital, time-stamped transaction inserted into the blockchain which can be accessed by the owner (student) at any time.   Abandoning siloes of institutional credit could bring cost-savings to institutions (along with requisite organizational changes) while simultaneously empowering students to manage their own credentials.[44]

Video 12: Understand the Blockchain in Two Minutes [Institute for the Future]

In 2017, MIT issued its first digital diplomas using an app called Blockcerts Wallet. Central New Mexico Community College recently became the first community college to issue diplomas and transcripts via blockchain. "Through the blockchain, which delivers a permanent record and tamper-proof security, CNM will begin providing select students with easily verifiable and secure higher education credentials that will always be at their fingertips, ready to be shared instantly with potential employers, other schools or anybody else the graduate designates, free of charge and without the need for an intermediary. Beyond grades and official diplomas, the digital record can also include detailed descriptions of skills learned."[45] Some experts suggest blockchain could transform education in other ways. Tapscott and Tapscott predict that

> The blockchain will enable the 21st-century institution of higher education to disaggregate into a network and an ecosystem—not a tower. Indeed, innovators have an enormous opportunity to create an unparalleled educational experience for students globally by assembling the world's best learning materials online and enabling students to customize their learning path with support from a network of instructors and educational facilitators, some of whom may be local and some halfway around the globe…. In this vision of a global network for higher learning, a student receives a custom learning experience from a dozen institutions, while the blockchain serves to track the student's path and progress. The student enrolls in his or her primary college and is assigned a knowledge facilitator, who works with the student to customize a learning experience, the journey, and outcomes.[46]

CONTINUOUS, ON-DEMAND LEARNING

Lifelong, continuous, constant … learning in the future may not be a matter of "going to college" but instead becoming a participant in a stream of customized learning that results in a variety of certifications. A report from the National Academies of Sciences, Engineering, and Medicine suggests "The 20th-century model of degree completion followed by a semi-permanent job based on that education is yielding to a model where degree completion is followed by more specialized on-demand education over one's entire career (which may include multiple occupations)" (p . 140).[47] The Institute for the Future contends that

> As connective and mobile technologies spread, content proliferates and becomes increasingly available through open sources, and new modes of value creation emerge, we are moving away from the model where learning is

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[44] Miranda A. (2018, October). What is the Blockchain and how can it transform education? Academic Impressions.

[45] CNM to Become First Community College to Issue Student-Owned Digital Diplomas. Central New Mexico Community College, November 15, 2017.

[46] Tapscott, D. and Tapscott, A. (2017, March/April). The Blockchain Revolution and Higher Education. Educause Review.

[47] National Academies of Sciences, Engineering, and Medicine. (2017). Information Technology and the U.S. Workforce: Where Are We and Where Do We Go from Here? Washington, DC: The National Academies Press.

organized around stable, usually hierarchical institutions (schools, colleges, universities) that for better and for worse have served as main gateways to education and social mobility. Replacing that model is a new environment in which learning is best conceived of as a flow, where learning resources are not scarce but widely available, opportunities for learning are abundant, and learners increasingly have the ability to autonomously dip into and out of continuous learning flows."[48]

But this does not necessarily mean that colleges will become irrelevant, but rather that they might serve as a platform through which individuals regularly access curated content, instructional facilitators, technologies, or other learning resources. Joseph Aoun, president of Northeastern University commented "it's not enough to proclaim we are embracing lifelong learning. It has to be on demand, it has to be relevant to what's needed in the workforce and employers have to be at the table."[49] A forward-thinking model of future institutions might be one that is not time-bound (no finish line) or place-bound, but rather an ongoing community of learners connected to experiences and opportunities.

NON-LINEAR, ACCELERATED FORMATS/COMPETENCY-BASED LEARNING

Larry Summers, President Emeritus of Harvard University commented "… for something that's all about ideas and for something that's all about young people, the pace of innovation in higher education is stunningly slow. We're still on a system where the break is in the summer. The reason we're on that system is that when everybody went to pick the plants, that was the natural way to organize school, and it's still going that way."[50] While the pace of change may seem sluggish, educational providers have long recognized that rigid semester-based, brick-and-mortar learning cannot meet the needs of all learners.   Adaptations include year-round calendars, frequent start dates, stackable (modular) experiences, online education, and competency-based education. Intentional efforts to disrupt the status quo are resulting in programs with multiple on ramps and off ramps that individuals can exercise at will.

One means of accelerating learning is through competency-based education (CBE) in which semesters and seat time are replaced by demonstration of competencies (skills, knowledge, and abilities).[51] According to the Lumina Foundation, competency-based education is well-suited to community colleges and can be used to mitigate inequities. They suggest that CBE programs can be intentionally designed to "prioritize and accommodate" students of color, unemployed/underemployed adults, and adults with some higher education experience but no credential.[52] Flexible scheduling and self-paced progression can often permit accelerated completion by enabling students to more easily juggle the complexity of work, child care, elder care, and other life circumstances.

Many community colleges currently are or previously have experimented with competency-based education including Central New Mexico Community College, Ivy Tech Community College, Forsyth Tech, and Sinclair College, Broward College, and Austin Community College. Competency-based education will also soon be introduced within the community college system through the California Online Community College.[53] In a study of outcomes of grant-funded CBE initiatives (consortium of Sinclair, Broward, and Austin), program and credential completion rates were highest among students with access to 100% online, flexibly paced courses with academic coaches.[54] According to an article in the Chronicle of Higher Education, competency-based programs offered at universities and colleges require a significant up-front investment, but

[48] From educational institutions to learning flows. Institution for the Future (2013).

[49] Ashford, E. (2018, May 1). Colleges Should Educate Students to Be 'Robot-Proof'. Community College Daily.

[50] Jenkins, R. (2018, February 21). This is Why Generation Z Will Skip College. Inc.

[51] Understanding Competency-Based Education Toolkit. Competency-Based Education Network.

[52] Krauss, S. (2017, October). How Competency-Based Education May Help Reduce Our Nation's Toughest Inequities. Lumina Foundation.

[53] Putting California's Working Learners at the Center: Design principles for the online community college. Institute for the Future/CCCCO. (2018).

[54] Person, A., Thomas, J., and Bruch, J. (2016) Outcomes of Competency-Based Education in Community Colleges from the Evaluation of a TAACCCT Grant.
Mathematica Policy Research.

can operate at lower cost than traditional programs.[55] The fee model for students is typically based on subscription or modular tuition rather than per credit or per semester rates.[56]

Another means of accelerating learning is to disrupt the academic calendar. While for-profit providers often operate on non-traditional schedules, the methods have also been successfully used in institutions of other types. Colorado College, a liberal arts college, opted for a block plan in 1970. Following this plan, students study one class at a time for 3.5 weeks followed by a 4.5-day break. Moving at this pace students are expected to complete 8 blocks per year. Another example is Odessa Community College in Texas which transitioned the majority of its offerings to eight-week sessions in 2014 and has experienced growth in both enrollments and completion rates.[57] At Southern New Hampshire University, new students can start a self-paced online program at the beginning of each month[58].

MICRO CREDENTIALS

The debundling of education combined with a digital environment, changing employer needs, and a plethora of learning options are changing the credentialing landscape. Employers now recognize a wide swath of evidence: badges, vendor certifications, nanodegrees, and a variety of other micro-credentials that are becoming increasingly commonplace. The State University of New York recently adopted a policy framework for implementing high quality micro-credentials across the 64-campus system. In a SUNY Task Force Report, seven potential benefits of micro-credentials were identified:

- "Motivate students toward completion of a credential or degree program by highlighting progressive attainment of competencies"
- "Support academic/industry partnerships through credentials that meet industry requirements and/or are designed to meet a specific need"
- "Provide more specificity to potential employers about skills and competencies learned"
- "Supplement an existing degree program with complementary skill sets"
- "Ladder from noncredit to credit"
- "Ladder from a stand-alone credential to a degree program"
- "Provide short-term, immediate competency development opportunities valuable for ongoing professional development"(p. 2)[59]

Alternative credentials that offer immediate verification of ever-growing skill sets may be particularly attractive to a flexible workforce that needs frequent upskilling to provide a continuous flow of independent income through short-term contracts. Micro-credentials can also help employers understand the exact skills a job candidate possesses. Good, Perea, and Radionoff (2016) noted "There is a fundamental communication gap where employers aren't sure what credentials include and students aren't equipped to clearly express their competencies based on their credential, if they have earned one."[60] Unlike transcripts that supply information from an academic perspective (courses and degrees), a digital badge specifies skills and competencies which more readily translate to the workplace. Badges can be posted to e-portfolios, digital resumes, and social media (e.g., LinkedIn) and offer a searchable mechanism for talent acquisition and management. Research from the Urban Institute also suggests that digital badges may hold promise as a strategy to

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[55] Berrett, D. (2016, October 18). Costs of Competency-Based Programs Come Into Focus. Chronicle of Higher Education.

[56] Understanding Competency-Based Education Toolkit. Competency-Based Education Network.

[57] Alvarez, J. (2017, September/October). The twelve most innovative colleges for adult learners. Washington Monthly.

[58] Ibid.

[59] SUNY Micro-Credentialing Task Force. (2018, January). SUNY Micro-Credentialing Task Force Report and Recommendations, The State University of New York.

[60] Good, L., Perea, B., and Radionoff, K. (2016, August 17). Market Relevant Credentials: The New Normal. Presentation

improve employment outcomes for underserved youth[61].

Micro-credentials and degrees are not mutually exclusive --- they can be a means of building working-learning models that make education more accessible to non-traditional students. For example, Northeastern University is already offering professional master's programs that build upon IBM badges and are considering other degrees and certificates[62].

The digital environment is also increasing competition in the education marketplace and eliminating the geographic ties of work and education that once drove students to local options. Colleges and universities, the traditional route to education, are only one sector of the myriad of options available for learning marketable job skills. A recent article tells the story of Kusal Kularatne who opted for a work-based internship supplemented by skill-building courses from Udacity and Coursera. The outcome of the non-traditional path was real-world experience, a network of mentors, and a full-time job offer.[63]

> **The knowledge-driven economy basically was one where the more you knew, the greater your competitive advantage. But the innovation economy is differently driven – it rewards initiative, it rewards smart risk-taking, it rewards learning through trial and error, it rewards collaboration...The college degree is an increasingly risky proposition. It used to be that a college degree guaranteed you a good job and a middle-class lifestyle. That's simply no longer true. The world no longer cares how much people know because Google knows everything. What the world cares about is what you can do with what you know.**
>
> Tony Wagner, as quoted in the Mic article, Is College Worth It? How the gig economy is reshaping higher education
> December 12, 2017

While individuals now have the alternative to acquire knowledge anytime from anywhere, the price points for access vary widely. Some providers offer a free set of online modules or classes with paid options if a badge, nanodegree, or other certification is desired. For example, the Microsoft Virtual Academy offers free online training with learning paths that lead to badges and Google offers free developers training that connects to Udacity nanodegrees. The University Learning Store, a partnership of well-known university continuing education providers (including UC Davis Extension), offers online learning apps resulting in badges for on-demand skill training which are explicitly packaged as a "new kind of credential" designed for the rapidly changing work environment.

EXPERIENTIAL LEARNING AND TRAINING PARTNERSHIPS

Pervasive news reports indicate that there is a skilled worker shortage and that reskilling incumbent workers is becoming a frequent need of employers. In order to respond, research indicates that colleges must strengthen partnerships with employers and become more responsive (or predictive) of employer needs. McKinsey Global Institute comments

> Providing job retraining and enabling individuals to learn marketable new skills throughout their lifetimes will be a critical challenge … Midcareer retraining will become ever more important as the skill mix needed for a successful career changes … Programs that can more quickly retool the labor force by focusing on re-training and credentialing at the level of skills in demand rather than multi-year degrees could be important. Business can take a lead in some areas, including with on-the-job training and providing opportunities to workers to upgrade their skills, both through in-house training and partnerships with education providers. (p. 19).[64]

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[61] Spaulding, S., and Johnson, M. (2016, May). Realizing Employment Goals for Urban Youth through Digital Badges: Lessons and Opportunities for Workforce Development. Urban Institute.

[62] Oblinger, D. (2018, August 27). Smart Machines and Human Expertise: Challenges for Higher Education. EducauseReview.

[63] Stauffer, R. (2017, December 12). Is College Worth It? How the gig economy is reshaping higher education. Mic.

[64] Manyika, J., et al. (2017, December). Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation. McKinsey Global Institute, McKinsey & Company.

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According to the Institute for the Future, "in the 2030 and beyond world, employers will no longer be a separate entity from the education establishment. Pressures from both the supply and demand side are so large that employers and learners will end up, by default, co-designing new learning experiences, where all learning counts.[65]" But the dilemma is often one of whether higher education institutions can move quickly enough to produce the workers that employers need.

One community college example of an employer-partnership is the Panasonic Preferred Pathway (P3) program at Truckee Meadows Community College. When a new Tesla gigafactory was built outside of Reno, the college worked with Panasonic, a Tesla supplier, to create accelerated, self-paced learning opportunities to train for a

Video 13: Panasonic Preferred Pathway (P3) program (Truckee Meadows Community College)

new career in just a few weeks in a high-tech advanced manufacturing lab. The program was hybrid and sponsored through scholarships from Panasonic. But it didn't end there – TMCC went on to develop the Gigafactory Training Gateway, which used a similar format to train technicians for Tesla and also developed an apprenticeship program[66]. Tesla has been impressed with the quality of the apprentices and is now promoting the successful partnership to other businesses.[67]

COHESIVE WHOLE

So how might all these technologies and practices come together? In a recent Forbes article, Mohanbir Sawhney, a professor at the Kellogg School of Management, hypothesized that the innovations adopted by Netflix, Uber, Adobe, Accredible, and others may be the answer that will create a cohesive and continuous learning experience for students. He comments

> This vision of lifelong learning challenges educational institutions to adapt their development and delivery models and employers to create customized learning journeys for employees. The future of lifelong learning will look very much like the software and content industries look like today. Educational institutions have a choice – they can disrupt themselves or be disrupted by startup companies who can create Learning as a Service (LaaS) by applying software innovations to the learning business.[68]

Katherine Prince, the Senior Director, Strategic Foresight at KnowledgeWorks, recently suggested these strategies for post-secondary institutions to adapt their models to the future of work:

- "Focus more on supporting deep personal development as well as context- and discipline-specific skills and knowledge.
- Diversify offerings and business models, with a multitude of formats and structures engaging learners and increasing access.
- Contribute to student-driven and student-designed ecosystems of support that evolve over time and reflect students' strengths, weaknesses and needs.
- Help students plan for both their careers and their lives and respond to changing conditions.
- Enable learners to weave in and out of learning experiences as their career development needs dictate.
- Collaborate more extensively with workplace partners.
- Shift the focus of faculty professional development toward supporting students' development of foundational skills and practices and attaining ongoing learning related to relevant workplace skills"[69].

Read the complete article: Preparing All Learners for an Uncertain Future of Work

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[65] AI Forces Shaping Work and Learning in 2030. Institute for the Future. (October 2018).

[66]Bouweraerts, P. (2017, June 5). New GOED Grant Furthers Tesla Training. TMCC College News.

[67] Eckland, R. (2019, March 18). Apprenticeship program fills the job gap. TMCC College News.

[68] Sawhney, M. (2019, March 4). Learning as a Service: Lifelong Learning in a Software and Services World. Forbes.

[69] Prince, K. (2019, February 17.) Preparing All Learners for an Uncertain Future of Work. Getting Smart.

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Food for Thought:

How are others responding to the need for non-traditional learning?

	Minerva	Western Governors University	SAP: Learning for Life	Udacity
Type	Hybrid University Program	Private, Nonprofit Online University	For Profit Technology Corporation	For Profit Online Learning Provider
Pitch	Immersive Global Experiences	Competency-based, Flexible Online Programs	On-demand, lifelong training in SAP products	Online Project-Based Nanodegrees
About	Philosophy & Pedagogy Guiding Principles *Video 14: Active Learning Forum: A New Way to Learn [Minerva KGI]*	 *Video 15: The Times They Are a Changing [Western Governors University]* *Video 16: Competency-Based Learning at WGU: What Is It?*	 *Video 17: SAP Learning for Life: Let's get ready to grow together – for life [SAP]* *Video 18: Welcome to SAP Learning Hub! [SAP Education]*	 *Video 19: What is a Nanodegree? [Udacity]* *Video 20: AT&T Partners with Udacity [Udacity]*

CONSIDER AND REFLECT

SPRINGBOARD QUESTIONS

- Consider what you know about ARC. How effective do you think it will be in the future of learning if it maintains the status quo?
- What are the implications for ARC and how it should navigate the future?
- What should the design principles be for the future of learning at ARC?
- Considering those principles, how might ARC do things such as:
    - enhance and extend the learning environment for ARC students?
    - innovate in terms of how it schedules, packages, and offers learning opportunities?
    - use technology to replace traditional learning tools (e.g., textbooks)?
    - develop personalized learning pathways?
    - create on-ramps and off-ramps across a lifetime of learning?
    - demonstrate essential skills gained from a liberal education?
    - help employers identify qualified candidates?
    - leverage automation, robotics, and artificial intelligence to optimize campus operations to better serve students and employees?
- What other implications do you envision for learning spaces (physical and virtual) and college employees such as instructors, tutors, and technology staff?
- If future students seek an individualized "playlist" of on-demand learning opportunities that can be certified, what might be necessary in terms of modularized learning, stackable credentials, or other strategies?
- How might ARC contend with the potentially conflicting ideals of lifelong learning and the completion agenda?

Want to Dig Deeper? Resources for Further Reading:

Future Forward: The Next Twenty Years of Higher Education (Blackboard)
The Future of Work and What It Means to Higher Education, Part I (Workday)
Relearning How We Learn, From the Campus to the Workplace (Cognizant)
Ask About AI: The Future of Work and Learning (Getting Smart)
Alternative Credentialing Infographic and Full Report (Pearson)
The Future of Jobs and Jobs Training (Pew Research Center)
Reading Signals from the Future: Educause in 2038 (Educause)
A Blended Environment: The Future of AI and Education (Getting Smart)
Q&A: Artificial Intelligence Expert Shares His Vision of the Future of Education (Ed Tech Magazine)
Virtual Reality, Mixed Reality, Immersion, and Gamification: How Immersive Technology is Changing the Way CSU Students Learn (CSU)
CNM to Become First Community College to Issue Student-Owned Digital Diplomas (Central New Mexico College)
Smart Machines and Human Expertise: Challenges for Higher Education (Educause)
Realizing Employment Goals for Youth through Digital Badges: Lessons and Opportunities from Workforce Development (Urban Institute)
The Blockchain Revolution and Higher Education (Educause)
What is blockchain and how is it transforming higher education? (Academic Impressions)
How Will We Uphold Equity in the Future of Work and Learning? 5 Highlights from Horizons (JFF)
7 Things You Should Know About Adaptive Learning (Educause)
Alternative Credentials: Prior Learning 2.0 (Online Learning Consortium)
How Competency-Based Education May Help Reduce Our Nation's Toughest Inequities (Lumina)
The Campus of the Future (Educause)

> **"Adaptation to shifting labour market needs requires continuous learning and a considerable paradigm shift from the current frontloaded education system model. Learning methods across all formats and timeframes, including adult-focused reskilling and upskilling, need to be adapted to foster curiosity, creativity, imagination, build confidence in continued learning, and inspire a desire for continued growth and development. Throughout the lifetime learning trajectory, a flexible, learner-centered approach is needed to provide both foundational and experiential learning, as well as empower learners to shape their individual skills acquisition trajectory."[70]**
>
> -- World Economic Forum

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[70] *Accelerating Workforce Reskilling for the Fourth Industrial Revolution: An Agenda for Leaders to Shape the Future of Education, Gender and Work*. World Economic Forum. (2017, July).

Preparing for the EMP

HIGHER EDUCATION LANDSCAPE

"Higher ed institutions are facing some serious challenges to stay relevant in a world that is diversifying and changing rapidly. They want to make sure that the experiences they have designed for students will carry the next generation forward to be productive citizens and workers. But institutions' abilities to keep up in our changing environment have begun to lag to a sufficient degree, such that alternatives to the traditional university are being considered, both by the institutions themselves and by their constituents and colleagues throughout the education sector. (Phil Long, Chief Innovation Officer and Associate Vice Provost for Learning Sciences at the University of Texas, Austin)[71]

Higher education's role is at a critical juncture and there is compelling evidence that the educational institution of the future must be agile, technology-infused, and forward-thinking (predictive) to thrive in an environment of extremely rapid change.
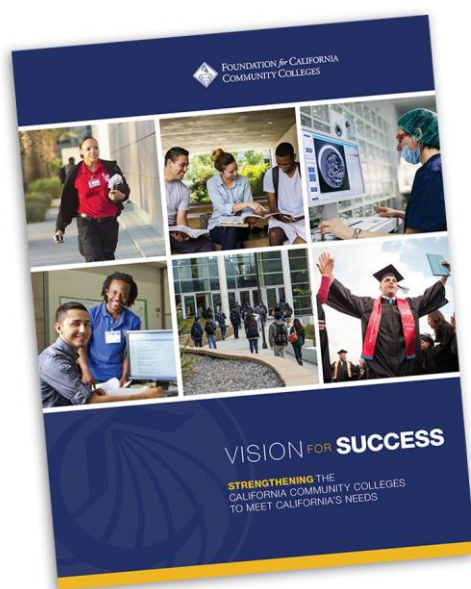
CA COMMUNITY COLLEGE ENVIRONMENT

The California Community Colleges represent the largest community college system in the nation and collectively serves over 2.1 million students annually.[72] The context of the system has significant implications for educational master planning and several recent developments are worth noting.

First, the Board of Governors for the system adopted the Vision of Success which introduced a set of system-wide goals. The 2018-19 state budget subsequently mandated college districts to adopt local goals aligned to the Vision for Success and performance reporting is expected to begin in May 2019[73]. The statewide goals place emphasis on the following areas:

- Increasing credentials earned (degrees and certificates)
- Increasing transfer
- Reducing excess unit accumulation
- Increasing employment in the student's field of study
- Reduce/eliminate equity gaps
- Eliminate regional achievement gaps

While local districts and colleges can certainly have additional goals, the Vision for Success has created a predetermined set of priorities.

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[71] Grush, M. (2018, March 12). On Change and Relevance in Higher Education: A Q&A With Phil Long. Campus Technology.
[72] 2019 State of the System Report. California Community Colleges Chancellor's Office, Sacramento.
[73] Vision for Success: Local Goal Setting Guidance

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Second, although overall and per student funding has increased substantially for community colleges in California, the funding model is becoming increasingly performance-based and complex. In 2018, funding reform was enacted which introduced a substantial level of performance-based funding. The previous model primarily incentivized enrollment of students and was calculated on the basis of FTES. The new Student Centered Funding Formula represents a major shift that incentivizes equity and outcomes, but also explicitly ties funding to performance objectives that support the Vision for Success. The funding formula will be phased in over three years (2018-19, 2019-20, and 2020-21). Districts, including Los Rios, are held harmless during this phase-in period and will receive a minimum of the 2017-18 allocation plus a cost of living adjustment.

According to the System Chancellor's Office, "the new funding formula recognizes that districts should receive additional resources to help certain groups of students who face especially high barriers in meeting their goals and it allocates them through a formula that is simple, transparent, and stable. By moving toward this blended formula, we are creating financial incentives for our colleges to make progress while making institutions more aware of their own performance." (p. 14)[74]

Image Source 3: 2019 State of the System Report, California Community Colleges Chancellor's Office

The new funding formula includes three components:

- 60% - Base allocation determined by district size/enrollment
- 20% - Supplemental allocation focused on equity (PELL grant, Promise grant, and AB 540 students)
- 20% - Student success allocation focused on outcomes – specifically, completion/attainment of:
  - Transfer level math/English within 1st academic year
  - 9 or more CTE units
  - Associate degree
  - Associate degree for transfer
  - Certificates of 16 units or more
  - Transfer to a 4-year institution
  - Regional living wage within one year of leaving community college

While the new formula is certainly not the primary driver of community college activities, institutions recognize that there is a new reality that requires an intentional approach to how activities are prioritized in order to optimize and sustain the funding levels necessary to serve the best interests of students.
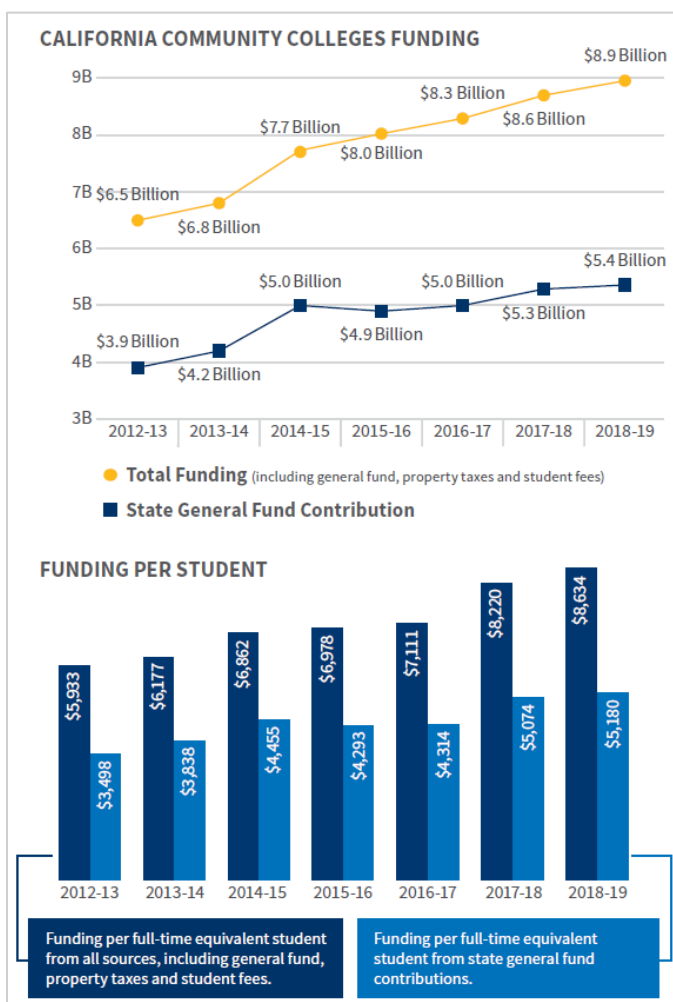
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[74] 2019 State of the System Report. California Community Colleges Chancellor's Office, Sacramento.

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Finally, the creation of a statewide, fully online community college is game changing since it shifts the concept of "community" from a local, geographic service area to a statewide, virtual community. While the rationale for its existence has been publicized, it seems apparent that this new entity is at least in part a response to the anticipated future of work and the disruption that is already occurring. It has been suggested that the other 114 colleges are not providing the flexible, accelerated, anytime/anywhere options that make higher education accessible to the working learner. As noted in the graphic below, it will use an adaptive, competency-based model to expedite certification and be offered in a self-paced, on-demand format.
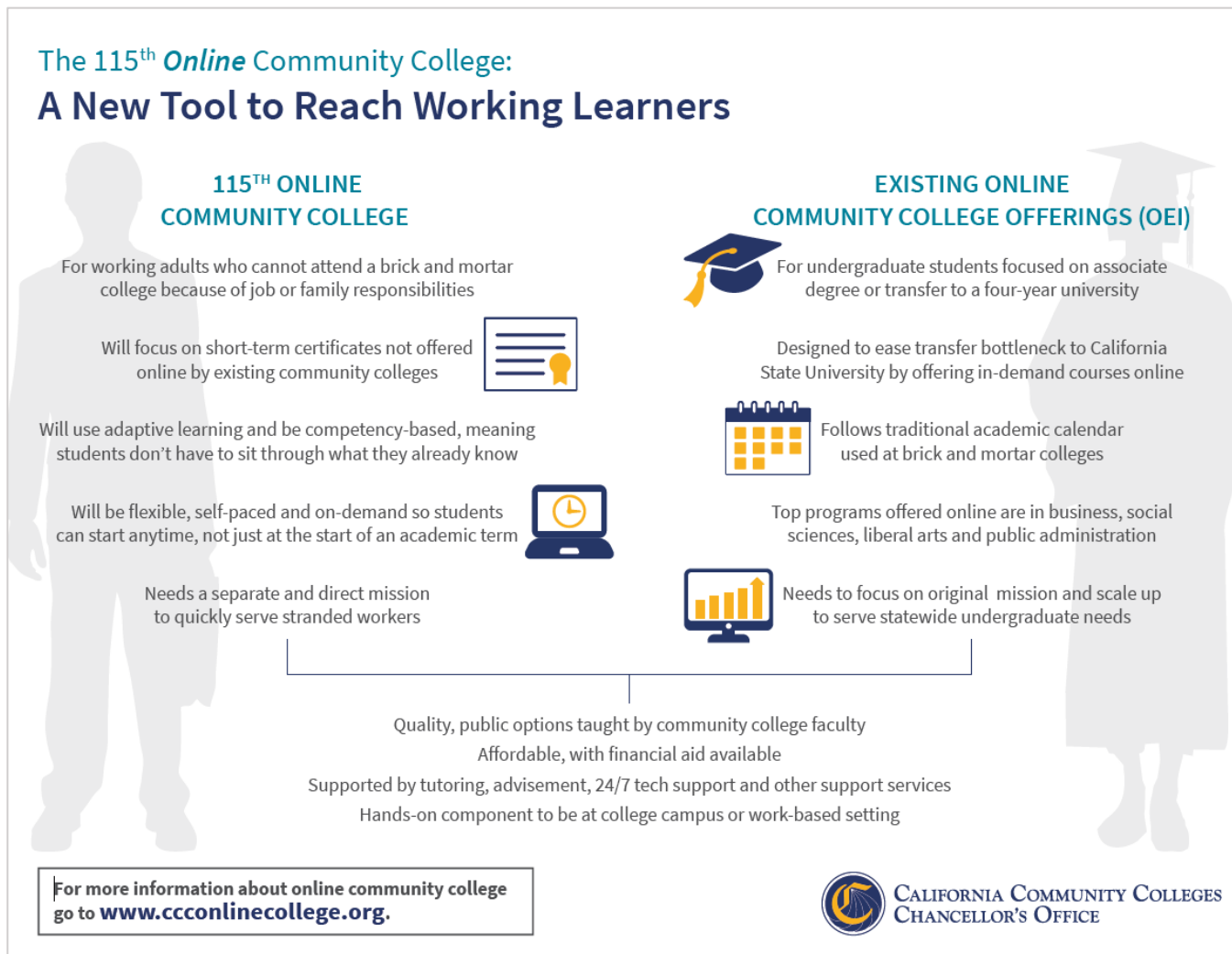

The 115th *Online* Community College:
A New Tool to Reach Working Learners

115TH ONLINE COMMUNITY COLLEGE

For working adults who cannot attend a brick and mortar college because of job or family responsibilities

Will focus on short-term certificates not offered online by existing community colleges

Will use adaptive learning and be competency-based, meaning students don't have to sit through what they already know

Will be flexible, self-paced and on-demand so students can start anytime, not just at the start of an academic term

Needs a separate and direct mission to quickly serve stranded workers

EXISTING ONLINE COMMUNITY COLLEGE OFFERINGS (OEI)

For undergraduate students focused on associate degree or transfer to a four-year university

Designed to ease transfer bottleneck to California State University by offering in-demand courses online

Follows traditional academic calendar used at brick and mortar colleges

Top programs offered online are in business, social sciences, liberal arts and public administration

Needs to focus on original mission and scale up to serve statewide undergraduate needs

Quality, public options taught by community college faculty
Affordable, with financial aid available
Supported by tutoring, advisement, 24/7 tech support and other support services
Hands-on component to be at college campus or work-based setting

For more information about online community college go to **www.ccconlinecollege.org**.

CALIFORNIA COMMUNITY COLLEGES CHANCELLOR'S OFFICE

Image Source 4: Infographic retrieved from http://doingwhatmatters.cccco.edu/Portals/6/docs/OCC/Infographic-Online-Community-College-Flyer.pdf

While the online college is controversial, it also could become a strategic resource because it is charged with activities that potentially could benefit the entire system. Some of the mandated activities include (*italics* added for emphasis):

- "Organize newly developed content, courses, programs, and students supports … that *lead to a pathway at a traditional community college*"
- "C*reate apprenticeship instructor upskilling training, courses, and programs* that are valued by the labor and employer communities."

- "Develop a Research and Development Unit that utilizes current and future learning sciences technology, assesses data metrics within the college's technological infrastructure to gauge student progress in a course or pathway, informs instructional and support strategies, and improves the functionality of the underlying technology used by the college. *Distribute gains in data and learning science and effective technology-enabled tools and resources throughout the California Community Colleges.*"
- "*Redesign transcripts in a digital, verifiable format* that links coursework, credentials, and competencies to track a student's entire body of learning in one document. *Any redesigned transcript technology shall be* a part of the integrated technology portfolio of the chancellor's office and *made available to any campus of the California Community Colleges.*"
- "*Utilize the Online Education Initiative's existing social and technological infrastructure* for students, instructors, and administrators, including all of the following:
  o Contribute to the Initiative's common course management platform for online content and classes.
  o Utilize and *develop comprehensive, specialized student supports that are technology-enabled for scale* and focused on the student experience, including, but not limited to, pathway navigation, online tutoring, online mentoring, and online help desk support. These supports, as well as the instructional delivery, shall be made available during nontraditional working hours to promote student success for the focus population.
  o Leverage free or low-cost, high-quality online educational materials for students through Open Educational Resources and the Zero-Textbook-Cost Degree Grant. *The college shall ensure any open educational resources that are developed are available for use by any California community college through the system's common learning management platform.*
  o Enhance systemwide student success efforts by using the College's innovative teaching and student support methodologies and technologies to *inform professional development opportunities* available to the rest of the system through the Online Education Initiative and the Institutional Effectiveness Partnership Initiative."[75]

Considering these requirements, the California Online Community College may be an entity to watch and engage with to surface innovative practices and cutting-edge learning technologies that could translate across institutional boundaries.

COMMUNITY COLLEGES IN THE DIGITAL ENVIRONMENT

In an interview about competing in the economy of artificial intelligence, Andrew McAfee, co-founder of the MIT Initiative on the Digital Economy comments

> When I look at the companies where I'm willingly giving more of my time, energy, and money and the apps that I use most often on my phone, it's amazing how little they make me think and how they're trying to get the headaches and the transactional nonsense out of my flow and instead start giving me something that I value. And we still like to have experiences … I think the experience economy is already pretty big, but as a share of the stuff that we want to do and that we want to spend our time and money on, it's probably going to get a lot bigger. So figure out what people actually want to do in this weird, new world free of all of the hassles we used to experience.[76]

To compete with other learning alternatives, community colleges must consider how to make the process of getting in, getting through, and getting information as hassle-free as the rest of the consumer marketplace. At the same time, the digital environment comes with barriers in terms of access and digital literacy. A recent study contends "among Americans who live in households earning less than $20,000 per year, only 64% use the internet or email, and less than half (44%) own a smartphone. Yet for low-income internet users who do own a smartphone, almost two-thirds (63%) say they mostly

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[75] California Assembly Bill 1809 (2018-19), approved by the Governor on June 27, 2018
[76] Kirkland, R. (2018, March). Competing in the AI Economy: An Interview with MIT's Andrew McAfee. McKinsey & Company.

go online from their phone. Far from being a luxury, smartphones offer a critical source of connection to jobs, family, education, and government services."[77] Without these connections, individuals from low-income households are further distanced from educational and employment opportunities.

For institutions, this issue requires special attention to ensure that necessary technological progress is thoughtfully approached with more than just digital natives in mind. A report from the National Academies of Sciences, Engineering, and Medicine notes that "while IT is likely to enable broader access to education, individuals without the opportunity or incentives to access it are at risk of being left even further behind, potentially reinforcing existing racial, ethnic, and socioeconomic disparities in society."[78] Conversely, technological advancements are also creating opportunities where none existed previously. Chris Jennings from the Analytics Academy at Google commented

> It's amazing to me that people in rural villages with no Internet can travel to a nearby city and download course content onto their phone and study it, develop mastery, go back and take a test and certify themselves as proficient in electrical engineering or computer science, and go out and get a job. I think it's going to have this hugely transformative effect on the world. We are, essentially, democratizing education and enabling those who are sufficiently motivated to educate themselves with a virtual community of collaborators for support. For me, this is truly phenomenal. It has the potential to empower millions of people throughout the world. (p.22)[79]

The takeaway for community colleges may be to view the digital environment from both perspectives, seeking ways to mitigate the inequities while harnessing it as a resource to foster economic mobility.

SOCIAL WELFARE ROLE OF COMMUNITY COLLEGES

While community colleges have historically served as a safety net in their communities, that role appears to be growing and is intrinsically interwoven with college-level efforts to close the opportunity gap and achieve social justice. Findings from the recent #RealCollege survey paint an alarming picture with 70% of responding California community college students reporting that they had experienced homelessness, housing insecurity, or food insecurity in the prior year with disparities based on gender, age, race/ethnicity, and a variety of other factors.[80] Academic progress and completion is particularly challenging when there is a lack of sufficient resources to meet a student's most basic needs. The anticipated automation of entry-level jobs makes education, traditional or non-traditional, essential to employability; however, it also may further worsen the opportunity gap of those who come from socio-economically disadvantaged backgrounds. While entry-level jobs may not pay a living wage, they are often the means that community college students use to close the gap between financial aid and living expenses.

Many community colleges already offer services that connect students to public benefits, provide health services, and distribute food, but there is advocacy for colleges to do more. A policy brief related to the #RealCollege survey recently suggested that community colleges could do more by offering the equivalent of a free school lunch program. Similarly, legislation (AB 302) is under consideration that would require community colleges to grant overnight access to parking facilities for the purpose of homeless students to sleep in their vehicles. Both of these proposals suggest treating the immediate symptoms, but fail to consider how to remedy the underlying circumstances that are ongoing in nature.

Some community colleges have designed more holistic methods to facilitate access to public benefits in tandem with

[77] Madden, M. (2017). Privacy, Security, and Digital Inequality: How Technology Experiences and Resources Vary by Socioeconomic Status, Race, and Ethnicity. Data and Society Research Institute.

[78] National Academies of Sciences, Engineering, and Medicine. (2017) Information Technology and the U.S. Workforce: Where Are We and Where Do We Go from Here? Washington, DC: The National Academies Press.

[79] Future Forward: The Next Twenty Years of Higher Education. Blackboard (2017).

[80] Goldrick-Rab, et al. (2019, March). California Community Colleges #RealCollege Survey. The Hope Center.

financial literacy and other services intended to move the student towards financial sustainability. A study of five participating community colleges using different models found that academic progress is positively impacted by these programs and that persistence increases among students who are receiving benefits.[81] While certain programs focused solely on students, others were open to families and members of the local community. Examples of the programs highlighted include:

Project Go (Cuyahoga Community College)

Single Stop USA (La Guardia Community College)

SparkPoint (Skyline College)

A similar study that examined nineteen colleges in Arkansas, California, Virginia and Washington highlighted practices and traits that not only addressed students' basic needs, but also improved their financial stability. The two most promising approaches were personalized assistance/financial coaching and a centralized hub where supports are accessed.[82]

ORGANIZATIONAL AGILITY

Higher education institutions will only be the first choice of students and an attractive partner of industry if they can keep up with the pace of change. Cyclical curriculum processes, slow adoption of technologies, and lack of agility are reinforcing the notion of the ivory tower that is out of sync with what is happening in society.

While certain institutions can be highlighted as innovators, a 2018 survey of students indicated that less than 5% currently have access to advanced technologies such as augmented/virtual reality goggles or 3D printers.[84] Research by Cognizant holds similar warning signs as businesses are moving towards refreshing learning content every six months, while educational institutions retain multi-year cycles for curriculum updates.[85] Jeff Schwartz of Deloitte observes that "learning is the job in the 21st century …. Individuals and companies need to be organizing around learning. And the learning needs to be organized around dynamism and change at speed."[86]

According to Cognizant research:[83]	
43% of businesses	update learning content **annually** or on a **biennial** basis; 75% intend to move to a refresh cycle of **6 months or less**
71% of higher education institutions	update their curriculum every **two to six years**

There's little doubt that Los Rios Community College District, and more specifically American River College, exists in a rapidly changing environment. Through its governance redesign and other efforts, the college has already made significant strides towards creating a more nimble structure that is poised to adapt quickly. As that work continues, it is likely to overlap and extend to the college's role within a multi-college district and within a large community college system.

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[81] Price, et al. (2014, November). Public Benefits and Community Colleges: Lessons for Benefit Access for College Completion Evaluation. DVP-Praxis, Ltd/OMG Center for Collaborative Learning.

[82] Price, et al. (2018, January). Community College Approaches to Address Basic Needs and Improve Financial Stability for Low-Income Students: Lessons from the Working Success Network Implementation Evaluation. DVP-Praxis.

[83] Bahl, M., Cook, M., and Nerurkar, K. (2018, November). Relearning how we learn, from the campus to the workplace. Center for the Future of Work, Cognizant.

[84] Brooks, D. (2018, August 8). The Campus of the Future. Educause Review, Educause.

[85] Bahl, M., Cook, M., and Nerurkar, K. (2018, November). Relearning how we learn, from the campus to the workplace. Center for the Future of Work, Cognizant.

[86] Schwartz, J. (2017, November 8) What's the Future of Work? Yale Insights. School of Management, Yale University.

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One piece of the puzzle is to create the conditions for collaborative innovation to surface new ideas and wrestle with the difficult challenges. Mrig and Sanaghan comment

> College and university leaders must find ways to catalyze innovation and new thinking on campus, and yet instead, over the last 10 years since the recession, colleges have survived by asking fewer faculty and staff to take on more work. One president summed up the challenge: "In our institutions, there is a capacity gap. Every day, we are so focused on everyday things that no one is waking up and thinking about the future. There is no unit out there that is R&D or Skunkworks." Yet in this environment, we need a lot of our people thinking about and discussing the future together—not just the senior cabinet. Leaders must empower innovation and future thinking throughout the institution" (p. 10)[87]

But innovation doesn't happen by chance. A report from the Georgia Institute of Technology concludes "an innovative organization encourages open discussion of ideas, has a reward structure for creativity, an embrace of experimentation, provides incentives for risk-taking, and learns from failure" (p.55).[88] This mirrors research by McKinsey & Company which indicates that it is a change of mindset that moves the organization from a sole focus on stability to a balance of stability and dynamic energy. They suggest that "when given clear responsibility and authority, people will be highly engaged, will take care of each other, will figure out ingenious solutions, and will deliver exceptional results" (p.7).[89] It is those ingenious solutions and exceptional results that may hold the most promise in the future of work and learning.

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[87] Mrig, A. and Sanaghan, P. (2018). The Future of Higher Education: Will Higher Education Sieze the Future or Fall Victim to It? Academic Impressions.
[88] Deliberate Innovation, Lifetime Education: Final Report. Commission on Creating the Next in Education, Georgia Tech University. April 2018.
[89] Agile Compendium. McKinsey & Company. (October 2018).

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Food for Thought: Georgia Institute of Technology

"…imagine a future in which the artificial barriers found throughout higher education disappear. Traditional conventions such as courses, semesters, and credits, even the academic calendar itself, will be reimagined. Unlike today, students will come … through multiple pathways, sometimes starting earlier in life. These students will experience undergraduate education in vastly different ways—through a mix of experiential and project based learning, online and hybrid classes, and interactions with … graduates taking professional sabbaticals or serving on Personal Boards of Directors. Many of them will never become "alumni" in the traditional sense, as they may return throughout their life for additional education" (p.60).[90]

Georgia Tech, a leader in innovation, recently went through a master planning process to chart the future to 2040. The executive summary of the final report begins with this statement: "This moment is ripe for change in higher education. Scores of technology entrepreneurs, foundations, and policymakers are already trying to shape what the future looks like for both learners and institutions. The message for colleges and universities is clear: they can either sit idly by or join in to design their own destiny" (p.4)[91] This conclusion surfaced through an extensive process that not only involved the institution's faculty, staff, and students, but gleaned ideas from a global design challenge run in collaboration with IDEO, a well-known design thinking firm, and the Department of Education. What were some of the strategies that emerged in the plan?
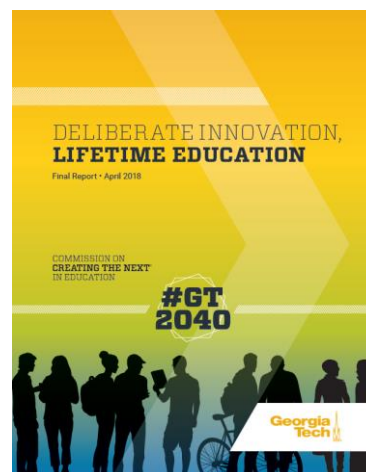
Commitment to Lifetime Education
- Eliminate artificial barriers between conventional schooling and higher education (p. 28)
- Allow for flexible pathways and calendars (p. 28)
- Award new kinds of credentials that recognize continual learning (p. 29)
- Build an institutional network in key areas around the globe (p. 30)
- Provide an advising and coaching network for life (p. 30)

Whole-Person Education
- Experiential learning (p. 35)
- Globalization at home (p. 35)
- Whole-person curriculum (p. 36)
- Microcredentials (p. 37)
- Matrix of minimester classes (p.37)
- Transcending the Carnegie unit aka competency-based education (p. 38)
- Advising for a new era including technology-enhanced and personalized advising for a lifetime (p. 42-46)
- Artificial intelligence and personalization (46-47)
- Distributed worldwide presence of gathering spaces (p. 46-51)

Deliberately innovative culture
- Systems approach to becoming deliberately innovative (p. 55-59)

The message for colleges and universities is clear: they can either sit idly by or join in to design their own destiny.

While Georgia Tech is a public research university, many of the concepts they surfaced are applicable across higher education institutions. In particular, the recognition that innovation must be deliberately cultivated is an essential key to navigating the future.

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[90] Deliberate Innovation, Lifetime Education: Final Report. Commission on Creating the Next in Education, Georgia Tech University. April 2018.
[91] Deliberate Innovation, Lifetime Education: Final Report. Commission on Creating the Next in Education, Georgia Tech University. April 2018.

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SPRINGBOARD QUESTIONS

- Consider what you know about ARC. How effective do you think it will be in the higher education environment if it maintains the status quo?
- What are the implications for ARC and how it should navigate the future?
- How might ARC strategically position itself to influence its environment and take advantage of emerging opportunities?
- How might ARC become an integral part of an individual's work-life balance creating a relationship that lasts over time?
- What role should ARC play in fostering agility, collaboration, and innovation within the college, across the district, and among the California Community College system?
- What implications does the new funding formula have for ARC? What opportunities does it create?
- How does the new funding formula align or conflict with insights gleaned about the future of work, future learners, and the future of learning?
- How might ARC position itself to strategically leverage the creation of the 115th (fully online) college and Los Rios involvement in the OEI in order to thrive in the evolving online education landscape?
- What technologies and practices might ARC explore to become even more agile?
- Where do opportunities exist for new or stronger collaborative partnerships with employers, educational institutions, government agencies, or other entities?
- What opportunities are there to strengthen ARC's social welfare role in ways that simultaneously promote student success and completion?

"An agile organization (designed for both stability and dynamism) is a network of teams within a people-centered culture that operates in rapid learning and fast decision cycles which are enabled by technology, and that is guided by a powerful common purpose to co-create value for all stakeholders."

-- McKinsey & Company, Five Trademarks of Agile Organizations

Vision for Success (California Community Colleges Chancellor's Office)
2019 State of the System Report (California Community Colleges Chancellor's Office)
Overview of the Student Centered Funding Formula (California Community colleges Chancellor's Office)
Funding Formula Non-Technical FAQs (California Community Colleges Chancellor's Office)
Putting California's Workers at the Center: Design Principles for the Online Community College (IFTF/CCCCO)
California Community Colleges #RealCollege Survey (The Hope Center)
Addressing the Basic Needs of California Community College Students (The Hope Center)
Community College Approaches to Address Basic Needs and Improve Financial Stability for Low-Income Students: Lessons from the Working Success Network Implementation Evaluation (DVP-Praxis)
The Co-creation Imperative: How to Make Organizational Change Collaborative (Forbes)
How Must We Evolve to Remain Relevant to the Student of Tomorrow (EAB)
The Future of Learning: Education in the Era of Partners in Code (KnowledgeWorks)
Exploring the Future Education Workforce: New Roles for an Expanding Learning Ecosystem (KnowledgeWorks)
Cultivating Interconnections for Vibrant and Equitable Learning Ecosystems (KnowledgeWorks)
Relearning How We Learn, From the Campus to the Marketplace (Cognizant)
How Will We Uphold Equity in the Future of Work and Learning? 5 Highlights from Horizons (JFF)
Higher Education as a Driver of Economic Mobility (Public Policy Institute of California)
Agile Compendium (McKinsey & Company)