



Stackable Credential Pathways

Report on Opportunities for Credential Attainment



2024

The Colorado Department of Higher Education
Report to the Education Committees of the House and Senate

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Introduction

Opportunities for Credential Attainment (Senate Bill 22-192) (C.R.S. §23-5-145.6) charged CDHE with building 10 stackable credential pathways across five high-value industries by January 1, 2025. The legislation also required the Department to create a non-degree credential evaluation framework by which to determine the quality of non-degree credentials, particularly those built into the stackable credential pathways.

According to National Student Clearinghouse data, there are more than 725,000 Colorado learners/earners with some college but no degree. As these learners seek the training necessary to obtain a good job and/or continue on their career trajectory, they may wish to pursue a non-degree credential of one kind or another. Non-degree credentials, such as industry certifications, state licenses, non-credit certificates, apprenticeship certificates, or for-credit certificates offered by institutions of higher education are enticing because of their short time to completion and typically lower financial cost relative to an associate or bachelor's degree. There are more than 1 million non-degree credentials available across the U.S. and there is a lack of clarity in the credential landscape regarding quality, value, portability, and how a credential leads to a next-level job along a career trajectory.

The goal is to provide improved navigation across an industry's many options to obtain an entry-level position through to next-level career attainment. The credentials that comprise the stackable credential pathways outlined in this interim report and in the final report due January 2025 meet the new definition and criteria for a quality and in-demand non-degree credential in the state of Colorado.

Reports are due to the Education Committees of the Senate and the House of Representatives on or before December 29, 2023, and December 31, 2025, regarding the implementation of the legislation. This first report presents the buildout of six of ten stackable credential pathways. Because these pathways are new, we do not yet have data from institutions regarding the total number of credits, credentials, certificates, and professional licenses earned in each pathway at each institution, nor for the state as a whole. Data will be collected and reported in the final report due on or before December 31, 2025.

Stackable Credential Pathways Process

The legislation (C.R.S. §23-5-145.6) provided CDHE with 1.5 FTE to carry out the project. These positions were hired in late 2022 and early 2023. In addition to these positions, the Colorado Department of Health Care Policy and Financing (HCPF) and the Behavioral Health Administration (BHA) contracted with CDHE to hire an additional 2.0 FTE to support the buildout of stackable credential pathways in healthcare and behavioral health, respectively. These positions were hired in early 2023. These positions are funded by American Rescue Plan Act (ARPA) dollars and are term-limited through September 2024 and December 2024 respectively.

A Stackable Credential Pathways Steering Committee was formed and convened for the first time in November 2022. The steering committee provided feedback on the industry areas on which to focus and has continued to meet bimonthly through 2023. The charge and membership of the steering committee can be found in Appendix A. Using [the 2021 and 2022 Talent Pipeline Reports](#) as guides, the steering committee determined the five industries of focus are behavioral health, cybersecurity, education, healthcare, and software development. Behavioral health and education were called out as critical industries in the 2021 report, and many occupations across cybersecurity, healthcare and software development were present in the 2021 Top Jobs list.

Five industry-specific Stackable Credential Leadership Teams were established and were convened for the first time in January 2023. These leadership teams have met monthly through 2023 and represent stakeholders from industry, postsecondary, K-12, state agencies, learner/earners, as well as non-governmental and advocacy organizations. Leadership team charge and membership can be found in Appendix B.

In addition to the steering committee and leadership teams, CDHE led a collaborative process from February through August of 2023 to develop and refine a non-degree credential quality definition and evaluation framework. In October 2023, the Colorado Workforce Development Council (CWDC) published the Quality and In-demand Non-degree Credential Framework (Appendix D). The credentials that have been built into the stackable credential pathways highlighted in this report meet the definition of quality and in-demand credentials that the framework provides. The Quality Definition and Evaluation Team membership can be found in Appendix C.

Colorado's Current Credential Landscape

As stated previously, the non-degree credential landscape across the nation continues to expand; however, there are national efforts to improve information about the relative value of these many non-degree credentials as well as the competencies that credential holders will have developed upon attainment. In Colorado, there are a number of best practices with regard to incorporating short-term credentials of value into longer-term postsecondary educational pursuits.

Examples of best practice include:

- evaluation of skills and competencies acquired via industry certifications or through registered apprenticeship experiences to verify competency equivalents with college courses to award credit for prior learning;
- public/private partnerships between employers and institutions of higher education to provide quality, for-credit work-based learning experiences as part of certificate and degree programs;
- early career exploration experiences for students in high school that align with industry certifications of value or college credit such as concurrent enrollment, dual enrollment, career and technical education, or other qualified postsecondary workforce programs; and
- opportunities for adult learner earners to engage in paid work-based learning opportunities at their job sites that provide the education and training necessary for career advancement with the same employer.

Best practices and partnerships such as these were shared early in the stackable credential pathways process and informed the work of the steering committee and teams. They are highlighted throughout this report.

There is no doubt that the development of effective stackable credential pathways hinges on employer engagement. The non-degree credentials that are built into the pathways must develop the skills and competencies that employers are looking for. Colorado has the infrastructure necessary to engage employers throughout the pathway development process and, when needed, in the curriculum development for new non-degree credentials. CWDC's sector partnerships and industry advisory groups (through Career and Technical Education (CTE) advisory committees) can and should play an important role in non-degree credential evaluation as well as in the curriculum design and redesign processes at institutions of higher education. Thanks to the leadership of the State Apprenticeship Agency, registered apprenticeships are another connection point between industry and education. There has been a long-standing disconnect between employers' focus on skills

and competencies and educators' focus on courses, credits, and program requirements. Through the process of early and regular collaboration, employers can inform postsecondary program curriculum to ensure program graduates are developing the skills and competencies most valued by employers. As skills are developed in sequences aligned to employers' hiring needs, the opportunity to stack additional credentials that lead to next-level job opportunities with higher earning potential expands. This report highlights examples of employer/educator collaborations that have led to exciting new entry-level non-degree credentials that meet employers' hiring needs.

Initial Observations

The approach to building out stackable credential pathways varied across each industry. This is due to the landscape analysis that was conducted at the outset of the work. Stakeholders at each of the industry tables pointed to industry-specific challenges as well as promising partnerships and practices. These industry-specific challenges and opportunities formed the basis of the stackable credential pathways buildout for that industry. As a result, the approach to building out stackable credential pathways has responded to industry-specific needs.

Stakeholders who have engaged in the stackable credential pathways work recognize flexible access to next-level credentials and career advancement as the cornerstone of the work. Traditionally, understanding of the education and workforce landscape has been linear: completion of high school to and through postsecondary education to a fulfilling and family-sustaining wage career. These linear paths, like economic models, are theoretical at best and do not reflect the way most Coloradans experience the education and workforce journey. If the narratives told and the pathways provided to learners/earners do not align with Coloradans' lived realities, is it any wonder there are more than 700,000 Coloradans with some college but no degree? Many Coloradans have postsecondary learning experiences while still in high school. Most Coloradans work while attending college or pursuing postsecondary training. Stackable credential pathways provide alternative on ramps to postsecondary education and training; provide off ramps to next-level, quality job opportunities; and provide on ramps back to education and training when learners/earners are ready for their next career advancement opportunity. Like a strand of DNA, work and education must be understood as interwoven, and navigation must meet a learner/earner where they are, must value the lived and work experience they possess, and must show them the opportunities available to them to get to their next career goal through quality education and training.

Building stackable credential pathways without learner/earner engagement leads to pathways that do not resonate with learners. Thanks to the support of the Attainment Network, CDHE was able to provide stipends to five learners/earners for their engagement with the Stackable Credential Pathways Steering Committee as well as with the five industry-specific leadership teams from June through September 2023. These tenacious participants shared their journeys through education and career, provided insights into the challenges they faced, the things and people that made a difference along the way, things they wish they had known earlier in their journeys and recommendations. Lessons from these learners are present throughout this report, and full learner voice summaries are available in Appendix E.

Quality Credential Definition and Evaluation Framework

The success of stackable credential pathways is conditional on the value of each credential in the pathway. CDHE led a collaborative process from February through August of 2023 to develop and refine a non-degree credential quality definition and evaluation framework. In October 2023, the CWDC published the Quality and In-demand Non-degree Credential Framework (Appendix D).

Process

From February through June 2023, CDHE convened a group of diverse stakeholders representing industry, postsecondary, K-12, state agencies, learner/earners, as well as non-governmental and advocacy organizations for monthly meetings to build and refine both a definition of a quality non-degree credential as well as a rubric by which to evaluate whether a particular non-degree credential meets the Colorado definition of a quality credential. This team used several national credential evaluation frameworks, particularly the National Skills Coalition's framework, as the basis for developing a draft definition and evaluation rubric. By June 2023, these monthly engagements with stakeholders led to a preliminary definition and set of evaluation criteria. In July and August 2023, these draft definitions and criteria were shared with stakeholders from across industry and higher education through a series of virtual and in-person listening sessions facilitated by CWDC. Feedback from these sessions informed an updated draft. In October 2023, CWDC published the Quality and In-demand Non-degree Credentials framework (Appendix D), which provides both the definition of a quality non-degree credential as well as a rubric to determine if a credential meets the quality definition.

Definition

Colorado's definition of a quality non-degree credential includes four signals of quality: demand, evidence of skills, employment outcomes, and stackability.



Demand. The credential must align with industry and economic demand. The credential is recognized in the marketplace and leads to job opportunities in growing industries and pathways.

Evidence of Skills. The credential must have transparent evidence of the skills and competencies learned when earning the credential.





Employment Outcomes. The credential must have evidence of substantial employment outcomes. There is proof that having the credential either directly leads to jobs paying a living wage in a growing occupation or develops the essential skills and competencies needed for those jobs.

Stackability. The credential can exist as part of a sequence of

credentials that can be accumulated over time to build skills and advance an individual’s career and earnings.

Rubric

To determine if a credential meets quality standards and should be recognized as a quality and in-demand non-degree credential, the following rubric was developed.

 Demand	<input type="checkbox"/> Connects to a Top Job or critical occupation listed in the Talent Pipeline Report over the last three years. <input type="checkbox"/> Defined as a regional need or emerging credential by the local Workforce Development Board or Approving Agency. <input type="checkbox"/> Accredited or recognized by a statewide or national industry-recognized accredited body.
 Evidence of Skills	<input type="checkbox"/> Provides clearly identified information on what skills and competencies are demonstrated by earning the credential.
 Employment Outcomes	<input type="checkbox"/> Directly leads to a job paying a living wage (as defined by the MIT living wage calculator for each county). <input type="checkbox"/> Develops the essential skills and competencies needed for jobs that pay a living wage. <input type="checkbox"/> Can be stacked with other credentials to earn a living wage in an in-demand occupation or career pathway.
 Stackability	<input type="checkbox"/> Exists as part of a stackable sequence of aligned credentials allowing for skill development, career progression, and increased earnings over time. <input type="checkbox"/> Is a prerequisite to a credential required by industry to obtain a job. <input type="checkbox"/> Leads to family living wage in a growing occupation on its own.

OR:

The credential must meet one (1) of the following criteria:

- The credential is required by law (i.e. Department of Regulatory Agencies or other regulatory/certifying agency) or is a prerequisite to a credential required by law.
- The credential is part of (or a prerequisite to) a Registered Apprenticeship Program.
- The credential leads to a critical occupation identified by the CWDC’s Career Pathways Team, as evidenced by being directly related to an occupation or pathway in Careers in Colorado in My Colorado Journey.

To be designated a quality and in-demand non-degree credential, the credential must demonstrate each of the four signals of quality: Demand, Evidence of Skills, Employment Outcomes, and Stackability. The credential must meet at least one of the criteria in each category or must meet one of the criteria outlined below the rubric.

Application

This tool will be used across state agencies to inform our understanding of which non-degree credentials meet the four signals of quality outlined in the definition and evaluation rubric. This quality framework informs the credentials built into the stackable credential pathways presented in this report and shall be used to measure the value of credentials on the [Career Development Incentive Program List](#) for K12 district reimbursement. CWDC plans to use the quality framework to evaluate credentials on the [Eligible Training Provider List](#). This framework will provide more transparency to Colorado learners/earners about the outcomes they can expect from pursuing certain credentials.

Behavioral Health

In 2021, the [Colorado Talent Pipeline Report](#) indicated Behavioral Health¹ was one of the state’s critical industries. This means that although Behavioral Health roles were not present on the Top Jobs list, the state recognized that labor shortages in this field must be addressed to ensure the economic success and wellbeing of Coloradans.

Examples of increased demand for behavioral health care providers can be seen in our emergency call data: “crisis calls surged within the state in 2021, with the Mental Health Center of Denver² reporting [2021]’s numbers to be 30% higher relative to 2020.” Additionally, “in April 2021, 29.3% of Coloradans who reported having higher levels of anxiety, depression, or both also reported having unmet needs for counseling or therapy. This is larger than the national level, whose total accumulated to 24.2% during the same time” (2021 Colorado Talent Pipeline Report, p. 17). In 2021, the Colorado Department of Labor and Employment (CDLE) reported a 152% increase in the number of behavioral health job openings between 2019 and 2022 - the largest increase of any industry in the state. CDLE also projected a 30% or higher growth rate for behavioral health jobs by 2030.

The effects of these shortages can also be understood in terms of the economic cost that unaddressed employee mental health (e.g., the mental health of State of Colorado employees) can have for employers. In [an article](#) describing national findings on these effects, Gallup authors stated: “projected over 12 months, workers with fair or poor mental health are estimated to have nearly 12 days of unplanned absences annually compared with 2.5 days for all other workers. Generalized across the U.S. workforce, this missed work is estimated to cost the economy \$47.6 billion annually in lost productivity.”

In response to these care and workforce needs, the [Colorado Behavioral Health Workforce Development Workgroup](#) developed two recommendations related to workforce and addressing provider shortages. The recommendations to broaden the current workforce and retain current professionals and providers support the need for stackable credential pathways in behavioral health. (2021 Colorado Talent Pipeline Report, p. 18).

Challenges in Behavioral Health Workforce Development

The following are the top two challenges facing the behavioral health workforce identified during the SB22-192 work:

High Demand, Low Wage

As previously stated, while behavioral health is presently an in-demand field in Colorado, it does not meet the criteria to be considered a Top Job. The criteria for Tier 1 Top Jobs in Colorado, as defined on the [Colorado Talent Dashboard Top Jobs and Careers](#) site “are benchmarked by an income that can support a family of three with two adults—one working—and one child. Tier 2 Top Jobs are benchmarked by an income that can support a family of one adult.” The absence of behavioral health jobs from this list implies that these roles do not currently meet these family-sustaining-wage criteria, which is indicative of the field’s low wages despite the

¹ In C.R.S. § 27-50-101(1), Colorado defines Behavioral Health as follows: “Behavioral health” refers to an individual’s mental and emotional well-being and actions that affect an individual’s overall wellness. Behavioral health issues and disorders include substance use disorders, mental health disorders, serious psychological distress, serious mental disturbance, and suicide and range from unhealthy stress or subclinical conditions to diagnosable and treatable diseases. “Behavioral health” also describes service systems that encompass promotion of emotional health and prevention and treatment services for mental health disorders and substance use disorders.

² [MHCD changed its name to Wellpower in 2022](#)

need reflected in behavioral health data mentioned above. As a mediating strategy to address this, the Governor's [2024-25 budget request](#) includes an across-the-board (ATB) provider rate increase of 1.0% for community providers and targeted rate adjustments in pediatric behavioral therapies.

There are multiple factors impacting this industry's wages, but after discussions with stakeholders and members of the Behavioral Health Stackable Credentials Leadership Team [referred to hereafter as the Leadership Team] one driving force of low wages are reimbursement rates. The Medicaid reimbursement rate makes it difficult to pay competitive wages and thus retain providers. Additionally, the Colorado Division of Insurance (DOI), which regulates the commercial insurance marketplace in Colorado, has received complaints from various behavioral health providers on the lack of reimbursement rate increases, challenges with administrative burden, and network admission. It reviews these issues and others as part of its Mental Health Parity and Addiction Equity Act (MHPAEA) enforcement, which assesses the comparability of physical and behavioral health coverage. While Colorado has not studied the impact of reimbursement rates on behavioral health workforce shortages, recent reports from [Washington](#) and [Oregon](#) both indicate that higher reimbursement rates were one solution to the behavioral health provider shortage. These reports caution that wage increases alone are not a complete solution but are of the highest priority in a holistic approach to addressing this shortage.

In addition to an overarching wage challenge, the Leadership Team identified that while the services of certain non-licensed staff (e.g., licensure candidates and peer support specialists) are Medicaid-reimbursable, those of other non-licensed positions are not, despite the fact that these providers fill vital roles in behavioral health facilities and ease access-to-care bottlenecks.

Long Pathway into a Licensed Clinician-Centric Field

A second challenge for the behavioral health ecosystem is the high reliance on masters-level licensed clinicians and licensure candidates. There are many reasons for the strong demand for masters-level and above clinicians. Licensed clinicians can independently offer services, while in Medicaid, unlicensed staff and licensure candidates must bill under a licensed clinician. This ultimately results in a high need for licensed provider types (e.g., licensed clinical social workers, licensed marriage and family therapists, licensed addiction counselors, licensed professional counselors, and licensed psychologists) to be available to supervise other roles. The pathways to becoming a [licensed behavioral health clinician in Colorado](#) are both time-intensive and costly. They require the completion of a Master's degree, as well as thousands of hours of supervised field work as a candidate, and the passage of a licensing exam before the candidate is eligible to hold their clinical license.

While seeking to ensure patients have access to these clinical provider types as needed is a vital component of behavioral healthcare, it is also important to recognize and support the role that non-licensed and clinical candidate providers play in patient care. Provider organizations, especially those operating within Medicaid and in rural areas simply cannot meet patient demand by relying solely on licensed clinicians. Increasing the number of non-clinical staff may increase access for patients who seek behavioral health care, and perhaps do not need access to a clinician based on the acuity of their presenting needs. Peer support specialists would be an example of a non-clinical role that utilizes their lived experience to coach others on their recovery journey. This type of increase also has the potential to diversify the workforce, which is an essential strategy for achieving the BHA's goal of enhancing equity in Colorado's behavioral health system.

In addition, by adding more levels of recognized staff, this strategy may enhance the capacity of licensed clinical providers to meet patient needs. In their most recent [Workforce Development Report](#), BHA notes, "By adding entry-level positions to support behavioral health team-based care, licensed clinicians will be able to operate at

the mid- to high-level of their scope of practice. By practicing at the top of their license, clinicians can utilize the full extent of their education and training, allowing them to focus on high-acuity needs, while expanding the umbrella of support across all levels of care” (p. 6). This topic will be the focus of continued research and stakeholder meetings by the coordinator and Leadership Team and will be revisited in the SB22-192 final report in 2025.

Colorado can support all these goals by developing multiple career pathways for non-licensed behavioral health providers. Some of this work is already in motion, with partners and stakeholders working to build additional entry points into the behavioral health workforce. These pathways must be available both to those seeking to enter the workforce and as upskilling opportunities for those already working in the field. It is the goal of the SB22-192 team and its stakeholders that stackable credential pathways in behavioral health support these solutions.

Opportunities in Behavioral Health Workforce Development

The following are promising and emergent practices in Colorado regarding the education, training, and expansion of the behavioral health workforce:

Microcredentialing at Colorado Community College System

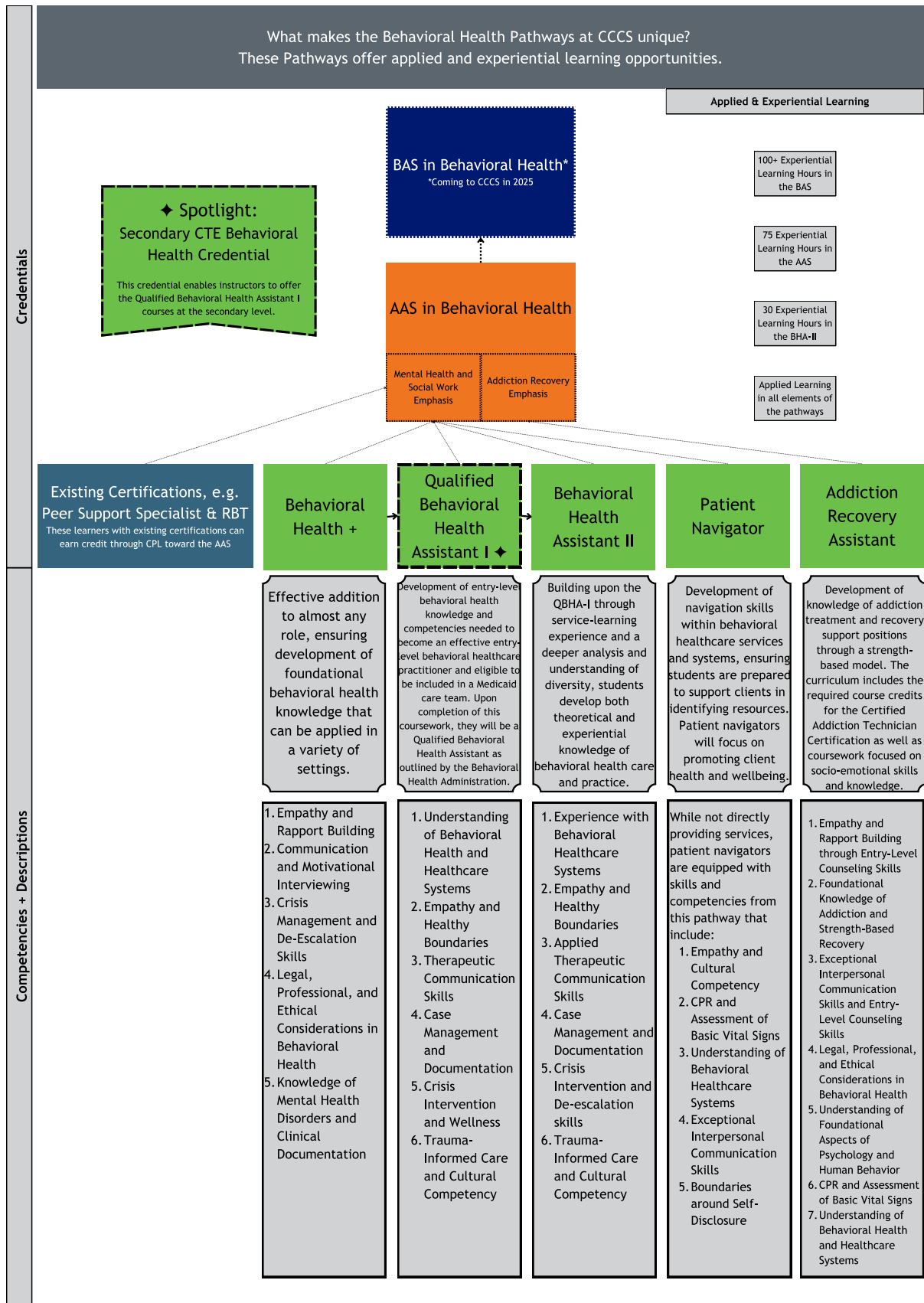
While SB22-192 (the Opportunities for Credential Attainment Act) called for stackable credential pathways, SB22-181 (the Behavioral Health Workforce Act), called for close partnerships between BHA, CDHE, and the Colorado Community College System (CCCS). In spring 2022, CCCS partnered with the Education Design Lab (EDL) to develop and launch five microcredentials in Behavioral Health:

- Addiction Recovery Assistant
- Patient Navigator
- Behavioral Health Assistant I – Qualified Behavioral Health Assistant
- Behavioral Health Assistant II
- Behavioral Health + (Supplement)

These programs are currently being piloted by Community College of Aurora and Pueblo Community College. Additional colleges within CCCS anticipate adding these microcredentials to their offerings beginning in fall 2024.

Following the launch of these microcredentials, the CCCS Behavioral Health Project Team continued to build out behavioral health pathways by initiating work on an associate of applied science (AAS) in behavioral health. This would allow someone who earns a microcredential to stack their learning and credits toward this newly proposed AAS. As of fall 2023, a CCCS core discipline team revised the existing AAS in behavioral health degree to include focus areas in mental health and social work alongside the existing addiction recovery focus area. The degree revisions included the creation of a new Career and Technical Education (CTE) prefix, BEH, and eight new classes that align directly with state regulatory agencies, industry, employee, and employer requirements and needs. This BEH prefix was created to allow a larger eligibility pool of CTE instructors in the behavioral health field, rather than restrictions to specific disciplines and prefixes such as psychology and human services. The planned launch of the new AAS pathway in behavioral health is fall of 2024. This includes a CTE secondary pathway to allow high school students more entry points to enter the behavioral health field.

Fig. CCCS Behavioral Health Stackable Credential Pathways

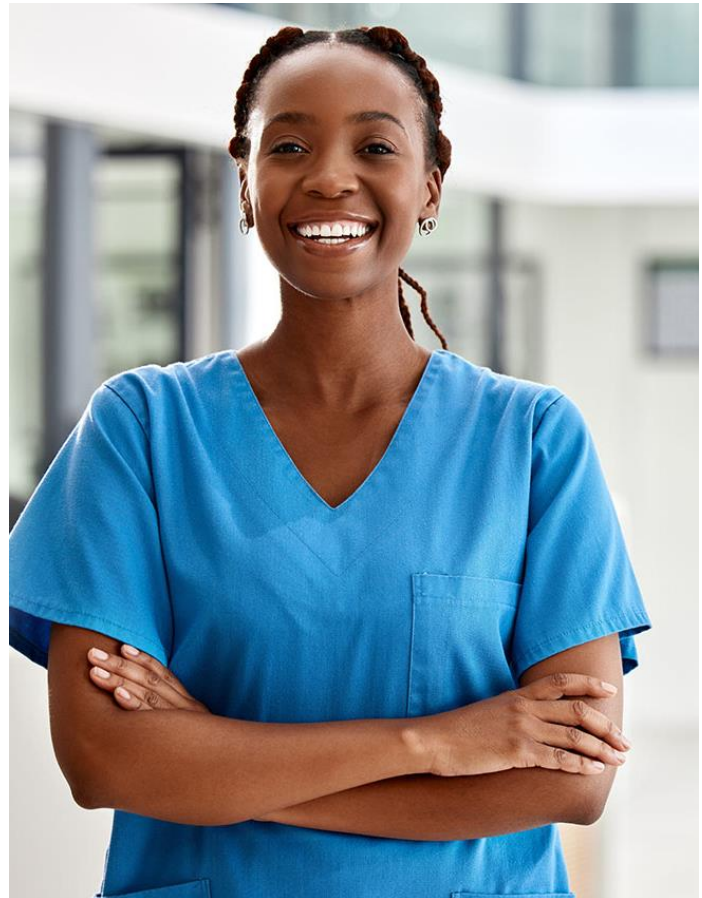


The continued development of a stackable pathway, from a microcredential to an AAS and onwards, creates meaningful career mobility and wage growth opportunities for Coloradans and may improve access to care for patients. Additional opportunities exist for partnerships between community colleges, area technical colleges, and four-year public and private institutions of higher education in the state. Many of these institutions are represented on the Leadership Team where discussions on potential partnerships, transfer agreements, and credit for prior learning regularly take place.

Qualified Behavioral Health Assistant

As directed by SB22-181, BHA has prioritized workforce development as a critical element in fulfilling the behavioral health needs of Coloradans. To that end, the BHA seeks to qualify an entry-level provider – a Qualified Behavioral Health Assistant (QBHA) – as a critical part of providing initial behavioral health services under the state’s Medicaid program. A QBHA, under supervision, will be able to facilitate elements of wellness promotion education, community needs assessments, screening, referrals, crisis management, orientation to services, and individual and group interventions. This role is like a peer support specialist but does not require lived experience of behavioral health needs, as a peer support specialist certificate does.

Employers express the need for this role as it would expedite the delivery of services, but QBHAs are not currently reimbursable providers in Colorado Medicaid. Securing BHA qualification of individuals who have demonstrated a list of competencies related to this role may aid in the recognition of this position by Medicaid in the future, contingent upon state and federal approvals.



BHA recognition of a QBHA will provide the behavioral health field with a clear, intentional behavioral health career pathway running from entry-level positions to higher-level roles. In addition, a formalized QBHA role will create a standardization of skills in the entry-level behavioral health workforce. This is something employers consulted in the development of this role have stated as a benefit. One of the most compelling elements of this role is the opportunity for it to serve as a gateway for community members to engage in the behavioral health workforce sector by providing an entry-level job onramp and a pathway from high school. The training to become qualified could be obtained after a GED/high school diploma but before an associate degree. All competencies of the role are built into the curriculum developed for high schools to offer through CTE (noted above) and such courses are recognized by post-secondary training partners for those individuals who wish to continue along this education pathway.

Additional Behavioral Health Training and Education Pathways

The following are additional options available to learners who wish to enter the behavioral health field:

Apprenticeships

In addition to strictly academic pathways, a key pathway-type for behavioral health providers-in-training is apprenticeship. There are currently at least three³ registered apprenticeships in the behavioral health field available in Colorado, and at least one behavioral health integration into the existing medical assisting apprenticeship is in development at Front Range Community College. Additionally, in September 2023 Governor Polis signed an [executive order](#) requiring state agencies to increase the number of apprenticeships available and specifically cited social work as an area of key need for apprenticeship program buildout. The CDHE Behavioral Health Credential Pathways Coordinator will be working closely with BHA to support this buildout, and these efforts will be detailed in the final report.

SPOTLIGHT

UCHealth offers a registered “Behavioral Health Aide” apprenticeship that allows someone to enter the workforce with no background in behavioral health and receive on-the-job, paid training. Within the UCHealth system, there are structured pathways to advance in one’s career after becoming a Behavioral Health Aide that are accompanied by an increase in pay and responsibility. The UCHealth Ascend Career Program can also assist employees with continued higher education costs as they progress in the behavioral health career. Of note, the CCCS Behavioral Health Project Team is in communication with this apprenticeship’s program manager regarding alignment with CCCS microcredentials and the future QBHA role.

Front Range Community College (FRCC)

Building upon their COHELPS-funded work to develop apprenticeships in the healthcare industry, FRCC now plans to create a non-credit course for the “Behavioral Health +” supplemental microcredential that can be paired with the current Medical Assistant certificate offered through the FRCC Apprenticeship pathway. This course will be built using the Course Learning Objectives from the courses approved in this microcredential pathway so that a crosswalk to credit can be established. Medical Assistants (MAs) are often a patient’s first point of contact when seeking healthcare services and MAs frequently take patient histories. By adding this supplemental credential, MAs will have increased training to better serve patients and look and listen for information that a patient may benefit from behavioral health support. This supplemental microcredential can help to ensure that behavioral health and wellness is a focus in medical settings, thus improving the patient’s overall well-being. In addition to improved patient care, the coursework will offer an introduction to behavioral healthcare, and may spark an interest in some learners to pursue additional behavioral health certifications in the future. Because the microcredentials offer similar coursework, and the pathways stack into the aforementioned Associate of Applied Science (AAS), anyone who has obtained the Behavioral Health + (Supplement) will already have completed coursework in the pathway that most aligns with their career interests.

³ In addition to the spotlighted UCHealth apprenticeship, the coordinator identified an apprenticeship for [Counselors](#) and [Licensed Addiction Counselors](#) in the State Registered Apprenticeship Database, which appear to assist apprentices with supervised clinical hours

K-12 Career and Technical Education Pathways

As of fall 2023, there are only three state-approved secondary behavioral health programs in Colorado (Future Forward at Bollman, Cherry Creek Innovation Campus, and Arvada West High School). Each of these programs offers different courses that currently do not align with an industry-recognized credential for entry-level job opportunities. Through the work of SB22-181, the state seeks to ensure that there are greater opportunities to run recognized and consistent secondary behavioral health programs across the state. With the new alignment of instructor qualifications and aligned course work (see reference to BEH prefix above), students will receive the skills that lead to an entry-level job in behavioral health. For more information, contact the state CTE office.

Stackable Credential Pathways in Behavioral Health

Following a year of statewide behavioral health stakeholder coordination and work with the Leadership Team, the two clearest stackable credential pathways in behavioral health that CDHE has elected to highlight are a pathway in social work and a pathway in addiction counseling. These pathways are described in detail below. Additionally, as mentioned above, the CCCS is building a behavioral health pathway that will be included in future reporting when complete. Notably, there are many educational and career opportunities in behavioral health, with opportunities for additional certification and skill development throughout a career. The following pathways are not the sole paths a learner could take (e.g., someone with a Bachelor of Social Work [BSW or BSSW] is not limited to only earning a Master of Social Work [MSW or MSSW] but could consider educational pathways that lead to the many other related fields mentioned earlier in this report). The intention of highlighting these pathways is to demonstrate the various entry and exit points a learner may take along their journey and to highlight that a learner can explore many options at the non-degree credential and associate degree level before selecting a path.

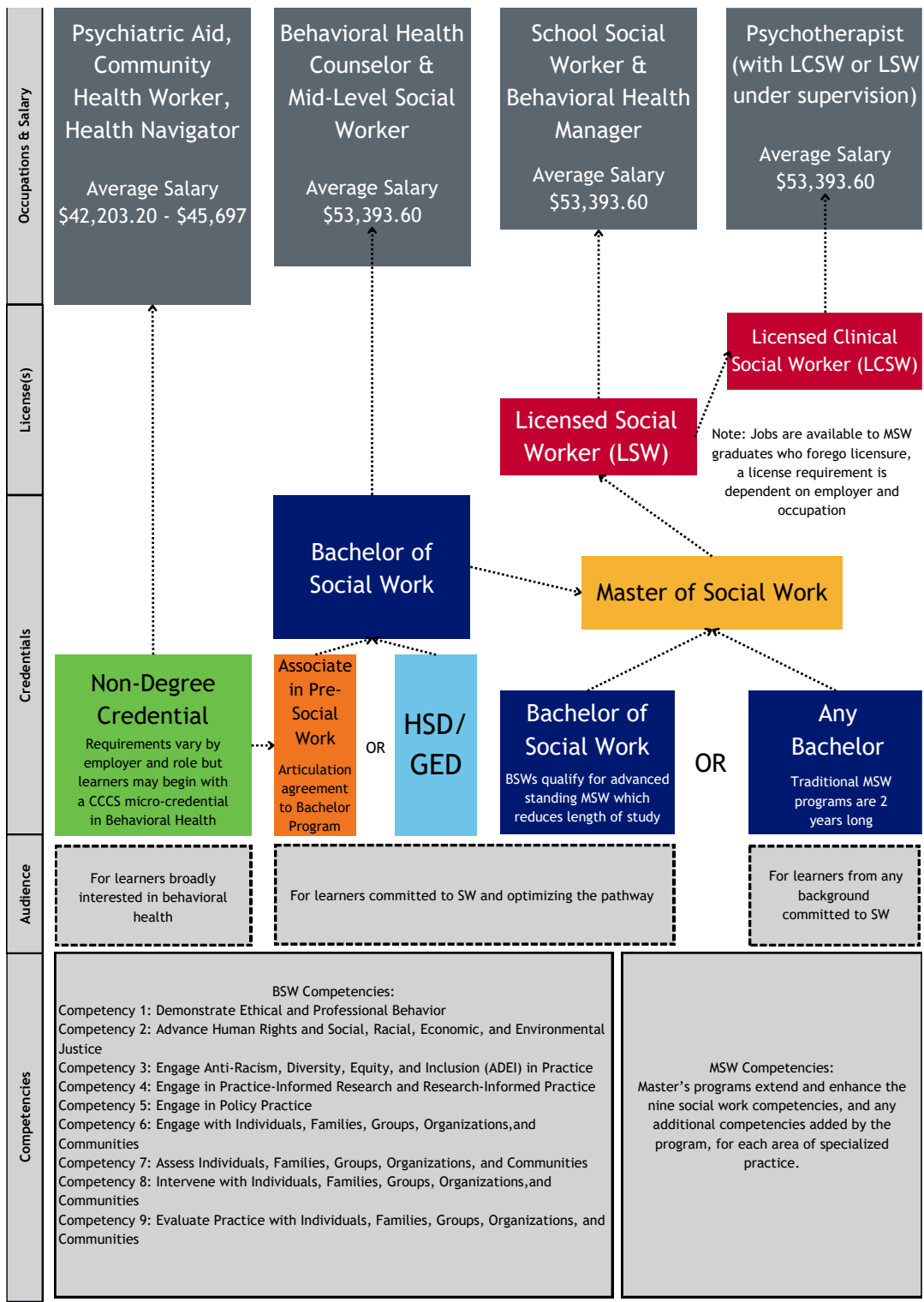
Pathway 1: Social Work

This pathway demonstrates that a learner can begin an associate degree in social work and continue their education through a bachelor's degree program (bachelor of social work, BSW) when studying at institutions with an articulation agreement. This ensures a smooth transfer of credits from a two-year to a four-year institution. If a student continues along this pathway after earning a BSW, many institutions offering a Master of Social Work (MSW) will offer an advanced standing degree program to the BSW applicant. The advanced standing programs acknowledge that the final year of a BSW program is aligned with the first year of a traditional 2-year MSW program, and thus shortens the amount of time it takes for a BSW graduate to complete their MSW. This method of expediting a learner's education can serve as a model to other behavioral health fields seeking to shorten the length of their traditional pathways.

SPOTLIGHT

A model partnership in this pathway is the articulation agreement between Red Rocks Community College and Metropolitan State University-Denver. Red Rocks' website explains: Social work students are currently able to attend Red Rocks Community College (RRCC) for two years to earn their Associate of Arts and then transfer to Metropolitan State University (MSU) or other four-year schools, to complete their bachelor in social work in an additional two years, with the option of completing their masters in social work in one additional year at MSU. This path allows students to attend RRCC for their general education classes, taking advantage of the lower class size and lower cost classwork.

Fig. Behavioral Health Pathway 1: Pathway 1: Social Work; Pre-Social Work, to BSSW, to MSW



Note: Occupations and average salaries from MyColorado Journey ⁴

⁴ Red Rocks Community College Social Work



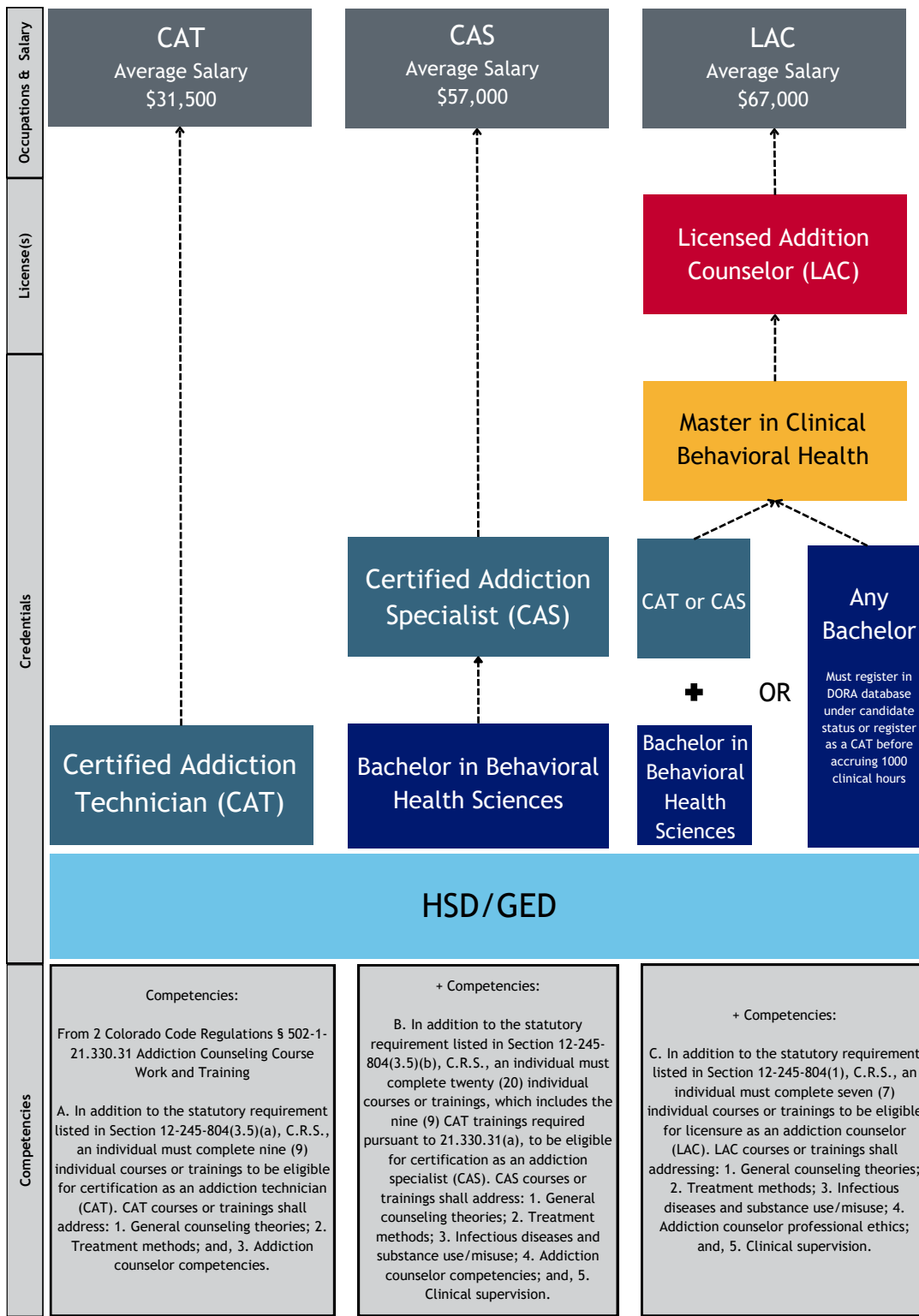
Pathway 2: Addiction Counseling

This pathway demonstrates that a learner can complete the training to become a certified addiction technician (CAT) from any state-approved training provider, and then upskill to a certified addiction specialist (CAS) upon completion of a bachelor's degree in the behavioral health field and other requirements. Learners already holding a CAT meet some prerequisites to becoming a CAS, and learners who go on to pursue a master's degree in a clinical behavioral health field and seek to become a licensed addiction counselor (LAC) may do so in less time if they have already completed CAT and/or CAS requirements. This is another example of a specific discipline's coordinated efforts to expedite a learner's education if they remain on a specific path. Learners also have the benefit of being qualified to work at the CAT and CAS levels as long as they wish and do not necessarily need to pursue an LAC if they do not wish.

SPOTLIGHT

A model program that supports a student at the entry and mid-level can be found at Colorado Mountain College. By way of a few routes (including their AA in Addiction Studies to BA in Human Services pathway), CMC provides clear pathways to students interested in becoming CAT or CAS certified. "Colorado Mountain College provides a comprehensive educational framework for entry into the field of addictions studies and offers a certificate of proficiency in Certified Addiction Technician (CAT, previously known as CAC 1) and a certificate of proficiency in Certified Addiction Specialist (CAS, previously known as CAC 2). CMC provides exceptional learning experiences in the mandatory coursework for each certificate, meeting the state and national standards for addiction work.

Fig. CAT-CAS-LAC Stackable Credential Pathway



Note: Salary estimates from CDLE ⁵

⁵ Colorado Mountain College Human Services Program

Recommendations

The following are interim recommendations to the committees from this first year of leadership team convenings, statewide stakeholder coordination and hearing learner voices.

1. Make it easier to become a behavioral health provider:

- Assess whether or not short training programs (microcredentials) are eligible for state or federal financial aid.
- Ensure that learners can make a livable wage while learning behavioral health skills.
- Find more ways to give college credit for prior work experience.
- Increase the number of CTE programs that focus on behavioral health careers.
- Make it possible for healthcare workers to learn about mental health tools.

2. Find new ways to attract and retain behavioral health workers:

- Use technology to show what skills people have.
- Create supportive programming for college students to help them stack credentials along a pathway.
- Learn more about mid-level mental health worker careers.
- Learn from other states with promising behavioral health programs such as North Dakota, Massachusetts, Wisconsin and Michigan.

Next Steps

In the second year of working on Behavioral Health Stackable Credential Pathways, CDHE, the coordinator, and the leadership team plan on continuing and/or initiating the following next steps:

1. Increase pathways available to and through the behavioral health field. Specific tasks include:

- Expanded adoption of microcredentials at postsecondary institutions.
- Develop articulation agreements between two- and four-year institutions. Identify alignment of the BAS degree in behavioral health (e.g., which master's programs accept a BAS degree, which four-years would like to build a more applied bachelor's degree).
- Create marketing and communication strategies that assist learners in the visualization of options to help with informed decision-making.
- In partnership with the BHA and the Office of Future Work, support the buildout of registered apprenticeship programs in social work, per the governor's [executive order](#).
- With partners and stakeholders, explore advocacy opportunities focused on mid-level providers.

Cybersecurity

Colorado, like many other states, is experiencing a significant shortage of Cybersecurity workers. The current workforce shortage is complex and is affecting individuals and our communities as seen through widespread and disruptive computer hacks. [Statistica](#) reported that in 2022, there were 1,802 cyberattacks in the U.S. and 422 million people impacted by those attacks (with many people being impacted by more than one attack). Employers are also heavily impacted. [Accenture reported](#) that 46% of cyber attacks are on businesses with 1,000 or fewer employees and [IBM reported](#) the average total cost of a data breach on larger organizations was \$4.45 million.

Colorado is uniquely positioned to expand its cybersecurity workforce to help address these issues. According to [Cyberseek](#), Colorado has 33,000 cybersecurity workers and almost 20,000 cybersecurity job openings, ranking 8th in the nation for cyber job openings. Colorado also has one of the highest concentrations of cybersecurity jobs per capita in the nation. The 2022 Talent Pipeline Report showed that computer and mathematical jobs are the fastest-growing major occupational group and that student interest in computer & information sciences is high, ranking second among industries of interest to college students. An information security analyst is also identified as a Top Job.

Colorado is not alone in facing challenges related to filling entry-level cybersecurity positions. [Cyberseek](#) identified almost 575,000 cybersecurity job openings across the nation. This shortage is particularly stark relative to the 1.2 million total cybersecurity workers in the U.S. Though we need to double the number of cybersecurity workers to meet demand, only about 25,000 people complete a cybersecurity training program on an annual basis. Without significant attention and new approaches and solutions, this shortage will persist.

Challenges in Cybersecurity Workforce Development

The following are the top three challenges facing the cybersecurity workforce identified during the SB22-192 work:

The best route to develop cybersecurity skills and obtain a job does not fit traditional higher education pathways.

The Cybersecurity Stackable Credentials Leadership Team identified that the number of full-time, entry-level jobs in cybersecurity are limited. This was confirmed through an analysis of job postings and input from employers when CWDC was creating cybersecurity career pathways. Most cybersecurity job postings expect two or more years of cybersecurity experience and few jobs exist in the state where someone can obtain the first two or more years of cybersecurity experience. Students should expect to start in roles where they focus on a few cybersecurity competencies part-time while working in the industry utilizing additional IT competencies. Roles that a learner/earner might have while building toward a career in cybersecurity might include working in a Network Operation Center (NOC) as a network or systems administrator, in desktop support, or in software development. Many of these roles do not require a bachelor's degree and some employers have removed degree requirements from their cybersecurity jobs. Even in the absence of a degree requirement, progressive education and credentialing with related work experience leads to higher paying jobs and could be stacked into associate and bachelor's degrees as a career advances. These need to stack as some employers and some cybersecurity jobs do still have degree requirements.

An additional challenge is that while credentials are important to signal technical competence, employers expressed that there are significant gaps in student and job seeker skills that would be for cybersecurity roles. When we asked the Cybersecurity Stackable Credentials Leadership Team which credentials were most important for success in a stackable career pathway, they valued the development of essential professional skills and foundational cybersecurity skills throughout the education journey over a specific credential. The Leadership Team felt that too few students graduate with these skills and many students with a natural aptitude never consider a career in cybersecurity. There is a tremendous need to develop essential professional skills throughout the educational system. These skills can be developed along-side the cybersecurity-specific skills needed for success in an entry-level cybersecurity job.

To identify the foundational skills of cybersecurity, the Cybersecurity Stackable Credentials Leadership Team developed a list of 13 cybersecurity concepts and practices that should be understood at a basic level as well as a range of jobs/competencies that use cybersecurity practices (Appendix F). It is not expected that an entry-level employee will be competent in all 13 concepts. However, entry-level employees should demonstrate a basic understanding of each and be ready to apply their competencies by identifying what needs to be secured, how to secure it, and what tools are available to help with job-related tasks. Many of the students who graduate from cybersecurity training programs lack the skills to succeed in entry-level cybersecurity positions.

Rural areas and small to mid-sized employers have an acute shortage of cybersecurity talent

As CWDC met with employers to build cybersecurity pathways, access to talent was a common issue for rural and mid-sized employers. Talent shortages escalate the need to monitor and protect the data networks of small, public-sector entities, such as counties, school districts, and fire districts. The Colorado Attorney General's office, in an expansion of Project PISCES in conjunction with Metropolitan State University Denver, hopes to provide service support.

Significant gaps exist in the resources needed to address the talent shortage.

To build the essential and cybersecurity-specific skills needed for success in entry-level jobs, a specific set of resources need to be available to students, and many are not available to most students.

The environments to practice cybersecurity skills are limited and many secondary schools lock students out of these environments because of the inherent cybersecurity risks. Because of the nature of cybersecurity training, access to real environments and tools that are used in cybersecurity attacks and defense are critical. However, these environments and tools are often 1) expensive, 2) require knowledge that is in short supply and 3) are seen as a threat to the IT departments that support the schools teaching these skills. This gap in training capacity limits opportunities to develop cybersecurity talent.

Cyber ranges are expensive and require expertise to establish. A cyber range is a controlled, interactive technology environment where students or workers can learn how to detect and mitigate cyber-attacks in a simulated work environment. Several organizations have looked to establish a cyber range, but the cost and effort to establish and run them has been a consistent issue, even for successful organizations. Some higher education institutions have attempted to share costs and resources for a cyber range, however, these efforts have stalled or stopped the implementation of ranges in Colorado.

Cybersecurity programs are also experiencing faculty shortages. Colorado's education system cannot produce the number of qualified talent without adequate faculty to instruct and oversee cybersecurity education programs. Stakeholder feedback suggests the shortage of resources to do adequate training leads to faculty

attrition. This issue is compounded when cybersecurity faculty could earn more in the field than in the classroom. Without significant attention, faculty shortages will persist, and the capacity of Colorado institutions to educate and graduate cybersecurity professionals into the cybersecurity workforce will be reduced.

Opportunities for Scaling Solutions in Cybersecurity Workforce Development

The CDHE Cybersecurity Stackable Credential Pathways Leadership Team identified several promising practices to enhance and scale the cybersecurity workforce.

Creation of pathways that meet employer need and provide paid work experiences necessary for career advancement

Colorado employers and educators have identified entry-level jobs in a cybersecurity pathway that develop cybersecurity expertise while providing the opportunity to work. There are strong financial incentives for both employers and employees to advance along these cybersecurity pathways. Employees have the opportunity to enter a field with limited entry-level jobs and filling vacant cybersecurity roles in Colorado would result in more than \$2 billion per year of increased wages. For employers, good pathway programs in cybersecurity could close workforce shortages beyond Colorado. The virtual nature of these jobs presents the opportunity to go well beyond addressing the 600,000 job vacancies in the U.S. as employers shift these jobs to where the workforce exists.



Many strong cybersecurity employers and jobs exist in Colorado, with a strong concentration along the Front Range and a consistent need across the state. This concentration creates an opportunity for stackable pathways to thrive in the industry. For instance, cybersecurity employers need employees to embrace life-long learning because the industry is continuously evolving. Many employers budget for employee development. Private sector resources could fund or incentivize the upskilling needed to make the stackable credential pathways work.

Several organizations in Colorado already upskill the cybersecurity workforce through existing sector partnerships, such as those with the Colorado Technology Association and the Public Education and Business Coalition. In addition, the National Cybersecurity Center not only leads the development of national cybersecurity models to detect, protect and deter threats, but it also runs a cybersecurity education program for adults and students in Colorado. We are also home to the Space Information Sharing and Analysis Center (ISAC), which facilitates collaboration across the global space industry. These organizations work with IT employers and schools to support student cybersecurity competitions that connect education and employment.

A strong military and veteran presence in Colorado provides a unique opportunity to fill many hard-to-fill cybersecurity jobs. Many Colorado cybersecurity positions require security clearances. Security clearances rank third on the list of Top Qualifications by Colorado Job Seekers in 2022 according to the Talent Pipeline Report. Because of a strong defense presence in Colorado, many military personnel are ready to transition to the civilian workforce and have security clearances, though many do not have cybersecurity work experience. With the right training, these individuals could develop the cybersecurity skills needed to fill entry-level jobs that require security clearances. Recruitment and streamlined skill-building opportunities should be enhanced and leveraged to increase the number of transitions out of the military and into civilian cybersecurity jobs.

The framework exists to train for the skills needed in entry- and advanced-level jobs

Colorado has 15 institutions of higher education that have been designated as National Centers of Academic Excellence in Cybersecurity, providing a common foundation for addressing cybersecurity training challenges and opportunities. Metropolitan State University (MSU) has a world-class cybersecurity range and leads the implementation of a program called PISCES, both of which are ready to be leveraged at a greater scale. Apprenticeships have been shown to effectively build the skills needed for success in entry-level IT positions and a transition to cybersecurity jobs. Strong apprenticeship foundations exist; there are four approved apprenticeship programs in cybersecurity already in Colorado and 20 additional approved occupations that could be developed into cybersecurity apprenticeships. Funding is also available through CO-TECH and other workforce system initiatives. Robust student interest exists in exploring a cybersecurity career, providing a strong pipeline of potential future cybersecurity employees. Colorado already has the foundations for a healthy cybersecurity workforce, though there are opportunities to scale our foundations to better meet demand. The Cybersecurity Stackable Credentials Leadership Team developed several recommendations to enhance the education and training ecosystem and address some of the challenges that must be overcome.

Stakeholders identified that career exploration in middle and high school is a common point of entry into cybersecurity. There are strong CTE programs at the state-level that support exploring cybersecurity jobs and the entry-level jobs that lead to careers in cybersecurity. Several strong CTE programs in school districts across the state support student attainment of one or more entry-level cybersecurity credentials: national organizations like SkillsUSA and Project Lead the Way support career development and competitions, such as CyberPatriot, that expose students to cybersecurity career pathways and help to increase career interest. These CTE programs should be leveraged to add the support needed to increase the number of students who obtain a credential and work in entry-level jobs that lead to a cybersecurity career using those credentials. The number of high schools that have these programs should also be expanded.

Stackable Credential Pathways in Cybersecurity

Following a year of statewide cybersecurity stakeholder coordination and work with the leadership team, the two clearest stackable credential pathways to highlight are two different pathways to information security analyst roles. One through stackable jobs and one through an apprenticeship. These pathways are described in detail below. Both allow workers to build experience and expertise as they move from entry-level to more advanced work, helping to reduce the shortage of workers with more than two years of cybersecurity experience.

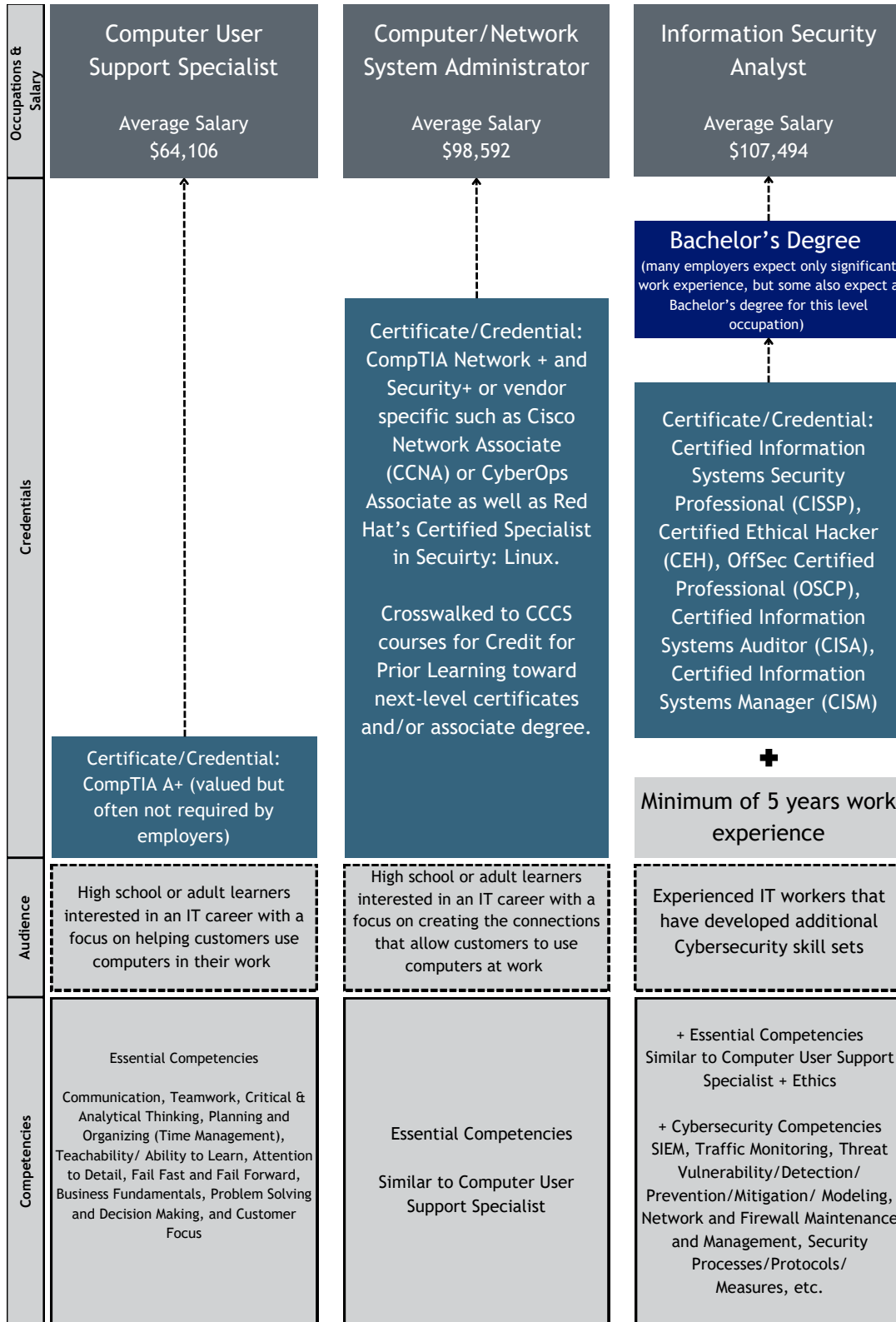
Pathway 1: Information Security Analyst via Industry Certifications and Work Experience

This pathway results in a credential while building essential professional skills and IT foundational skills. In this pathway, learners/earners:

- obtain a job as a computer user support specialist and accrue work experience while building deeper IT skills,
- complete additional education to obtain more advanced credentials including those valued for cybersecurity jobs,
- obtain a job as a computer or network system administrator while building deeper cybersecurity skills,
- complete additional education to obtain more advanced cybersecurity credentials,
- and finally, obtain a job as an information security analyst.

While this pathway mirrors how employers view advancement opportunities, further work is needed for colleges to translate the additional work experience into credit for prior learning.

Fig. Cybersecurity Pathway 1: Computer User Support Specialist to Information Security Analyst





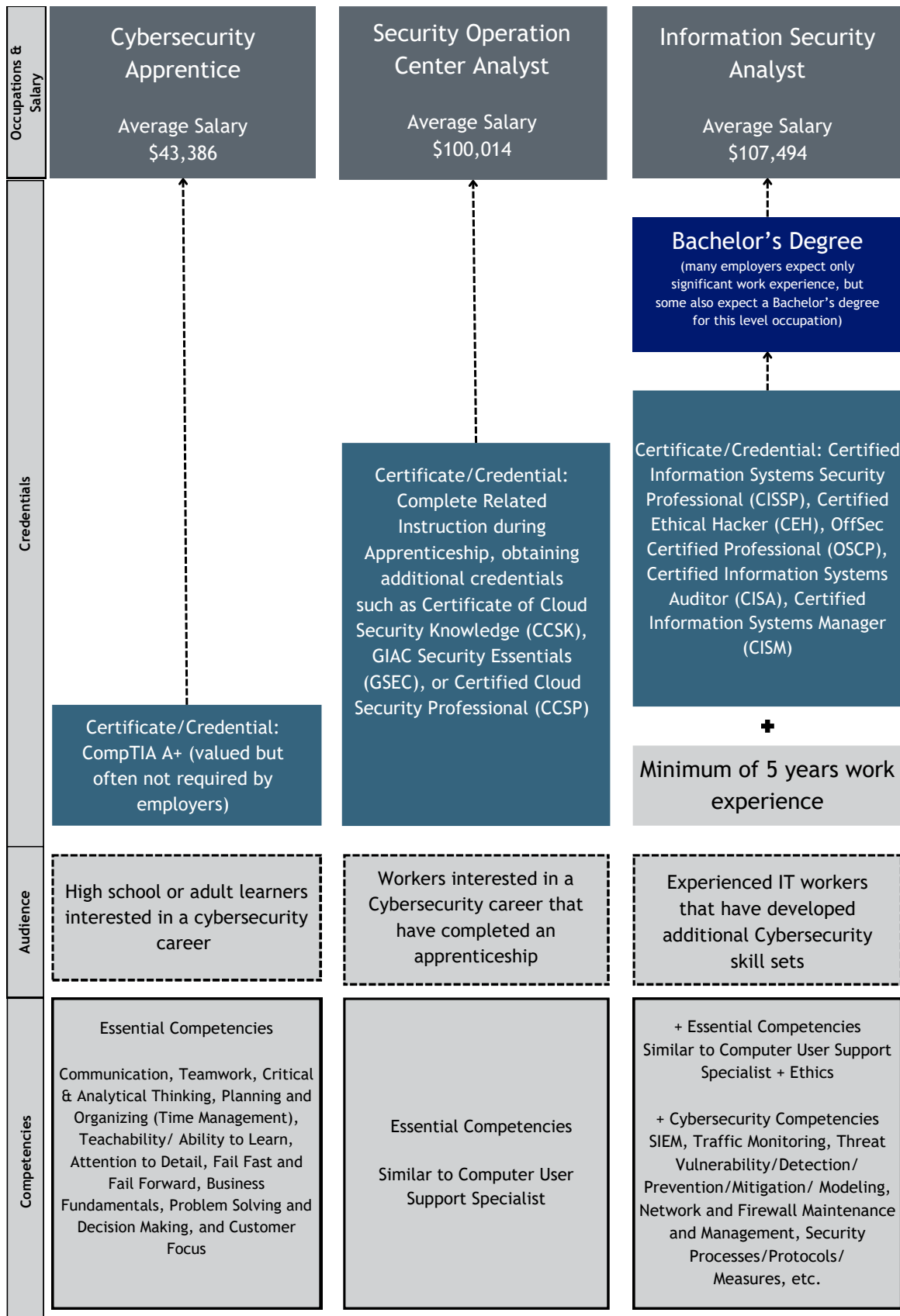
Pathway 2: Information Security Analyst via Cybersecurity Apprenticeship

In this pathway, learners/earners complete education through a pre-apprenticeship that results in a credential while building the appropriate essential and IT foundational skills and:

- obtain a job as a cybersecurity apprentice and obtain work experience while completing related instruction and building deeper cybersecurity skills,
- complete additional education to obtain more advanced credentials including those valued for cybersecurity jobs,
- obtain a job as a security operations center analyst while building deeper cybersecurity skills,
- complete additional education to obtain more advanced cybersecurity credentials,
- and finally, obtain a job as an information security analyst.

While this pathway exists, more work is needed to expand the number of apprenticeships and security operation center analyst jobs available in Colorado.

Fig. Cybersecurity Pathway 2: Cybersecurity Apprenticeship to Information Security Analyst



Recommendations

From this first year of leadership team convenings, the following are interim recommendations and considerations to the committees regarding future stackable credential work.

1. Make learning cybersecurity better:

- Teach important essential skills in all cybersecurity classes.
- Ensure statewide access to training environments where learners can practice cybersecurity skills.
- Explore how to obtain resources for students to participate in cybersecurity programs and activities like Project Lead the Way, CyberPatriot and Junior ROTC.
- Make classes more relevant by solving real-world problems through the use of both essential and cybersecurity skills.
- Increase paid work-based learning experiences for students and give them credit for it.

2. Encourage schools to support students on a cybersecurity pathway:

- Support robust cybersecurity educator recruitment to address the teacher shortage.
- Support ways for students to learn about cybersecurity careers and see what real jobs are like.

3. Increase employer involvement in building career pathway activities:

- Bring industry experts into the classroom.
- Make it easier for people to switch to cybersecurity careers through skills-based hiring.
- Expand entry-level job opportunities for people starting in cybersecurity.

Next Steps

In the second year of working on cybersecurity stackable credential pathways, the leadership team plans to continue and/or initiate the following next steps:

1. Build support for implementing the recommendations that require additional funds and/or resources.

2. Continue to work on the implementation of several recommendations, including:

- Expand the Credit for Prior Learning list for additional cybersecurity credentials.
- Develop recommendations to teach essential skills and cybersecurity foundational competencies in the classroom.
- Develop recommendations for how Colorado could create cybersecurity learning environments for students around the state.
- Develop guidance for students and job seekers to understand, develop and communicate the essential and cybersecurity foundational competencies and credentials important for success in an entry-level cybersecurity job.
- Develop an initial plan for how colleges can value entry-level IT work experiences to award credit for prior learning.

Education

Education is an industry that was identified in the 2021 Talent Pipeline Report that is in high demand, has statewide shortages, and struggles because of low wages. According to the [2022-2023 Colorado Educator Shortage Survey](#), of the total teaching positions to hire, 722 (8.71%) remained unfilled for the entire school year and 1,486 (17.92%) were filled through a shortage mechanism, including long-term substitutes, retired educators, alternative candidates, and emergency candidates. Of the total special service provider (SSP) positions to hire, 257 (17.52%) remained unfilled for the entire school year, and 153 (10.47%) were filled through a shortage mechanism. Surveys such as the one referenced above show that shortages are high across the state, with the greatest shortages in early childhood education (ECE), paraprofessionals (also referred to as paraeducators), special education providers, and significant support personnel, but the reality is that shortages cut across the entire educator landscape. This poses especially unique challenges for rural communities. Of Colorado's 178 districts, 148 are rural or small rural with nearly 150,000 PK-12 students. Per the Colorado Center for Rural Education's (CCRE) annual report, Colorado's teacher shortage is acute in rural and small rural districts where they do not have enough teachers in all content areas (e.g., mathematics and science) and all special services provider areas (e.g., counselors and nurses). In addition to shortage mechanisms, the Colorado Department of Education (CDE) created [Multiple Measures of Content Competency](#) for licensure.

Multiple Measures of Content Competency is a first step in broadening the ways that first-time teachers demonstrate content competency for their endorsement area. In addition, Colorado passed legislation to provide educator stipends, loan forgiveness and extend [Care Forward](#) to Career Advance Colorado and develop teacher apprenticeships through the passage of [SB23-087](#). [Career Advance Colorado](#) is a workforce development initiative providing free training for in-demand jobs through the state's 19 community and technical colleges and includes early childhood education and elementary education. Colorado's Institutions of Higher Education (IHE's) Early Childhood and Educator Preparation Programs were also innovative in expanding partnerships for apprenticeships, and partnerships between community colleges and four-year schools beyond two-plus two agreements.

SB22-192 is an opportunity to continue and expand efforts to address the educator shortage and create upward mobility for entry-level roles like teacher assistants and paraprofessionals. The Education Stackable Credentials Leadership Team met monthly over the past year to collaborate on how to enhance or develop credentials that stack from entry-level certificates to associate degrees in Education from Early Childhood to PK-12. The leadership team identified the following four areas of focus:

- identify opportunities to build or expand paid apprenticeships to recruit paraprofessionals and assistant teachers at higher wages and create additional on-ramps for other school roles such as transportation, food service, or another entry-level role to move into educator positions;
- create seamless pipelines between early childhood education and K-12 programs;
- incentivize/develop greater flexibility in educator preparation training and retention strategies;
- and crosswalk licensure requirements with certificate and degree attainment.

Challenges in Educator Workforce Development

The following are the top two challenges facing the educator workforce identified during the SB22-192 work: Numerous entry points to early childhood education careers, and high-demand, low-wage positions.

1. Numerous entry points to early childhood education careers

One challenge in Colorado is that there are more than 50 ways to enter the early childhood education workforce, per a conversation with stakeholder experts in ECE. This is both a pro and a con as it can allow more individuals to enter the workforce, but the diverse pathways are hard to navigate and at times teachers may be required to take similar or redundant coursework to qualify for a different position. This can make the cost of training high and deter future educators. Streamlining credentials that could be broadly accepted at centers will help alleviate the confusion for learners in their journey to becoming an educator. The more that other courses and trainings or work-based experiences are crosswalked, the more opportunities will be created for learners/earners who are not able to move beyond their current role to continue their education through associate and bachelor's degrees to earn increased pay. Streamlining credentials can also shorten the time to complete a degree. Another area that would benefit from such crosswalks is the apprenticeship to degree pathway. Such crosswalks and streamlined credentials increase access and equity. One promising move is that Colorado Early Childhood Workforce, under guidance from the Colorado Department of Early Childhood (CDEC), is making significant strides towards embracing competency-based learning and pairing it with higher education traditional programs that allow for Prior Learning Assessment opportunities from non-degree credentials and trainings.



SPOTLIGHT

Early Connections Learning Academy developed an innovative Child Development Associate (CDA) program. The CDA is an internationally recognized credential that provides hands-on training, work experience, and coaching support to Teacher Assistants interested in obtaining their credential to become teacher qualified. As learners complete their CDA, they are offered incremental pay increases. There is a scholarship available to cover the cost of the CDA application (\$425) through Red Rocks Community College (RRCC). In addition to the scholarship, RRCC provides additional coaching and a \$200 stipend. As Learners continue their education at RRCC for further certificate and the associate of art in early childhood education, they are then able transfer to a 4-year bachelor's in early childhood education with institutions that have signed on to statewide articulation agreement.

SPOTLIGHT

Colorado Mountain College offers an institutional scholarship for learners pursuing Early Childhood education. The scholarship prioritizes bilingual applicants and applicants from historically marginalized communities to improve their representation in the teaching profession.

2. High-demand, low-wage positions

It is well known that the shortage of educators across the state is an extensive problem. As a critical occupation with low wages, early entry is important to offset such low wages to improve educator recruitment. The path to licensure is long. Additionally, as highlighted in the [Colorado Early Childhood Compensation and Benefits taskforce](#), compensation is one of the greatest factors for teachers leaving the profession and is key to the retention and recruitment of great teachers. Occupations in education do not pay livable wages, especially those entry-level positions such as teacher aide and paraprofessionals. According to the Talent Pipeline Report “the living wage in 2022 has increased by 10.6% and 17.2% year-over-year....” wages are not keeping up. It is important to note that the Colorado Department of Early Childhood (CDEC) was recently awarded a grant from [the Early Educator Investment Collaborative](#) (The Collaborative) to support systems innovations increasing compensation for the early childhood education (ECE) workforce.

Opportunities in Educator Workforce Development

Early care and education professions are critical occupations often referred to as the “workforce behind the workforce or the profession that makes all others possible”. They are also not considered high-wage earnings; early entry is important to offset this by reducing debt. In grow-your-own models, high school learners can begin a pathway by learning to provide care for young people and infants. Using prior experience for credit and cross-walking additional training can benefit teacher assistants and paraprofessionals by recognizing the work they have already invested and the skills they have gained.

In 2020, HB-1002 passed, awarding college credit for work-related experience. The [CDHE 2021 report on prior learning assessment \(PLA\)](#) highlighted that national studies by the Council for Adult and Experiential Learning have demonstrated that students who earn credit for prior learning, CPL, (an average of 15 credits per learner) have better postsecondary outcomes than those who do not—they complete degrees at higher and faster rates than students without CPL.

Financial incentives are another key to creating impactful pathways. The impact of stipends is great, with initial evidence coming from HB22-1220: [Removing Barriers to Educator Preparation](#). CDHE, in collaboration with educator preparation programs, surveyed students who received the Educator Stipend. The report highlights the impacts of those stipends. Marzano Research found that receiving a Colorado Center for Rural Education (CCRE) stipend increased retention for both in-service and preservice teachers. The average retention rate for rural Colorado schools was around 82%; however, teachers who received a stipend were more likely to remain teaching in a rural school for one, two and three years—thus reducing the teacher shortage.

In addition to the incentives mentioned above, the impact of other scholarships and financial assistance through the [Career Advance Colorado](#) programs was instrumental in students being able to enter college and earn certificates in early childhood education, as these certificates are not covered by financial aid. It is one thing to have credentials stack but not being accessible financially is a barrier. Colorado extending these dollars with Career Advance Colorado allows students to earn college credit and a certificate that can lead to further degrees. Equally important is that they can earn while they learn.

Clarifying and supporting credential attainment and shoring up the ECE to K12 pipeline will help diversify our K-12 teachers. The National Council of State Legislatures noted, “the predominantly female (94%) early care and education workforce is more racially and linguistically diverse than K-12 teachers. People of color comprise 40% of early care and education professionals, and 22% are foreign-born.”

Finally, although educator preparation programs being available online and hybrid have been instrumental in increasing access, it is important to note that there is still a digital divide, which poses challenges, particularly for rural and marginalized communities.



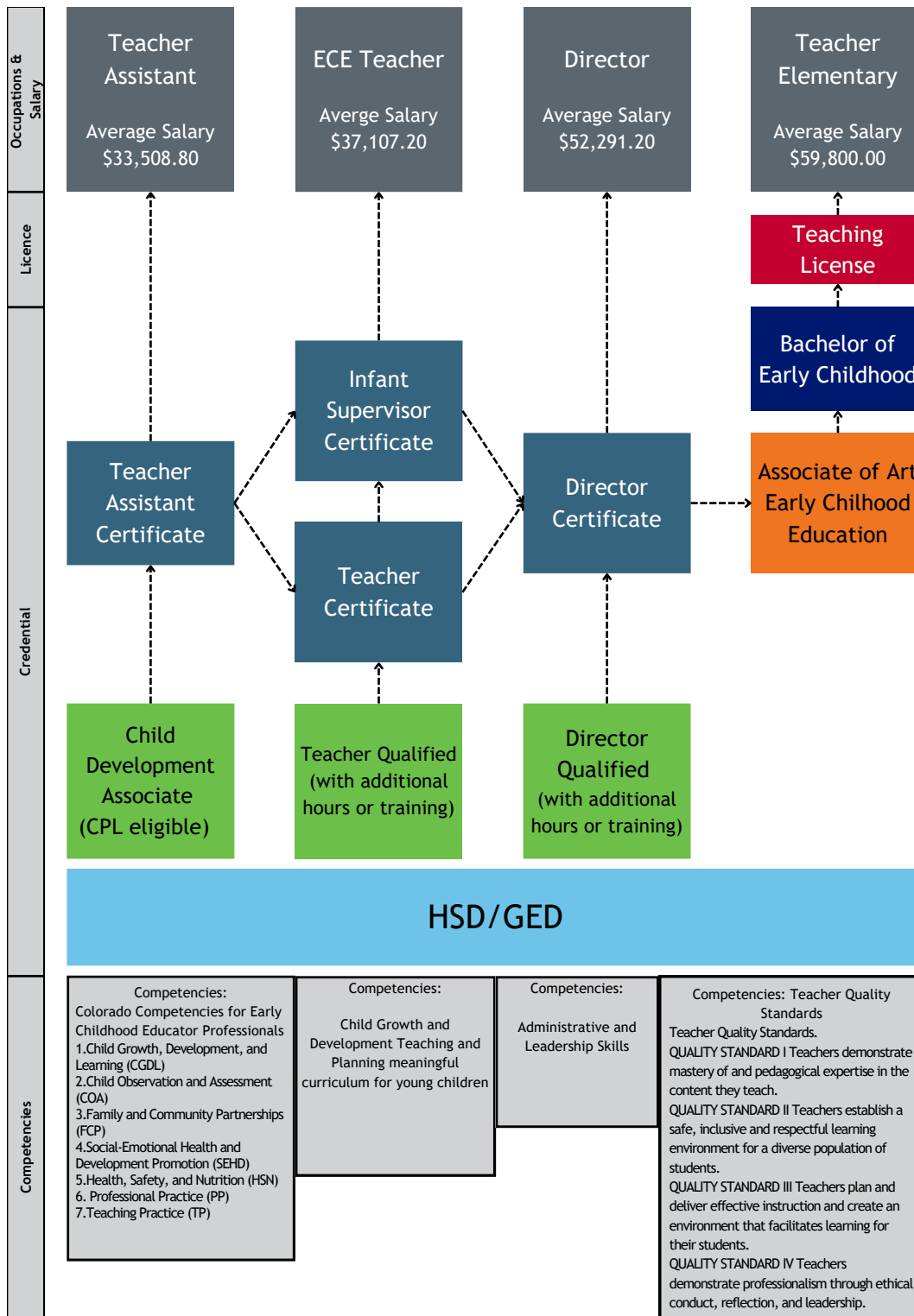
Education Stackable Credential Pathways

It is important to emphasize that the traditional, linear pathways to advancement in early childhood education include the pursuit of a bachelor's degree, or perhaps first an associate degree and then a bachelor's degree. There are, however, a myriad of non-linear pathways to the same end. This report illuminates two alternative, non-linear pathways through the education and training needed to advance in early childhood education. These pathways are designed to support easier navigation along the career and education trajectory but are not meant to indicate the only pathways open to Colorado learners/earners or provide guidelines.

Pathway 1: Early Childhood Education to Degree + Licensure Birth to Age 8

The ECE to licensure pathway demonstrates that a learner can earn either a non-degree or degree-based certificate to become a teacher assistant, teacher or director qualified. The non-degree credentials are earned through a points system through the Early Childhood Professional Development Information System (PDIS). The Child Development Associate (CDA) Credential is internationally recognized and has been crosswalked and added to the Common Course Numbering System's Credit for Prior Learning Matrix providing college credit for credential completion. Learners at a community college can begin with the teacher assistant certificate and then can stack into the teacher or infant supervisor certificates (where offered). They can then pursue the director certificate, which stacks into the Associate of Arts degree in Early Childhood Education and, via a [statewide transfer articulation agreement](#), transfer to a four-year university to complete a Bachelor's degree in Early Childhood with teacher licensure, resulting in the learner being qualified to teach early childhood and early grades in elementary.

Fig. Education Pathway 5: Early Childhood Education to Degree + Licensure for Birth to Age 8

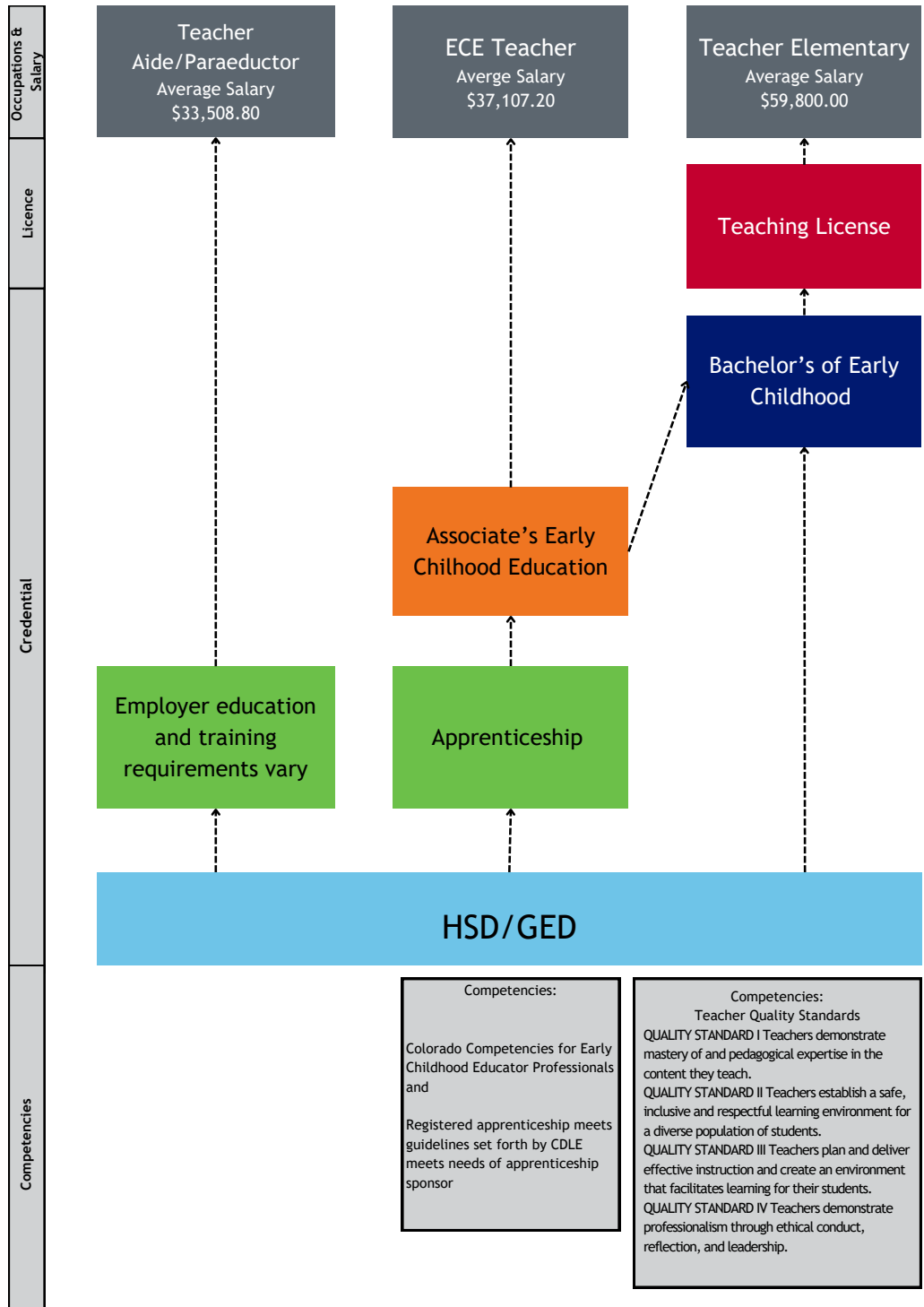


Note: Occupations and average wages were found in My Colorado Journey. Beginning salaries will be lower and salaries are offered across a wide range. [Colorado's Competencies for Early Childhood Educators and Professionals](#) are introduced in the CDA and Teacher Assistant Certificate and scaffolded throughout the learner's education and experience. For ECE endorsement and Licensure, they will meet [Teacher Quality Standards](#).

Pathway 2: Early Childhood Apprenticeship to Degree

The learner can begin an ECE-registered apprenticeship program partnered with an institution of higher education and work as a teacher assistant or paraeducator. The learner receives credit for prior learning for apprenticeship work-based experience to complete an associate degree. They can later transfer to a four-year university to continue and complete a bachelor's degree in early childhood. This is a new and emerging pathway, and there are opportunities to build additional apprenticeships in ECE and our K-12 space.

Fig. Education Pathway 6: Apprenticeship to Degree



Note: Occupations and average wages were found in My Colorado Journey. The program meets early childhood registered apprenticeship guidelines and Colorado's [Competencies for Early Childhood Educators and Professionals](#).

SPOTLIGHT

Red Rocks Community College (RRCC) has a registered ECE apprenticeship program and has recently developed a Degree Apprenticeship Associate of Applied Science in ECE. They plan to begin offering this degree pathway in Spring 2024.

SPOTLIGHT

Colorado Mountain College, in addition to offering a traditional Associate's in Early Childhood Education, also offers an Associates of Applied Science in Early Childhood Education that can stack into their Bachelor's of Applied Science in Leadership and Management. This type of degree is important as per the National Conference of State Legislatures' Who Are Early Care and Education Professionals, "home-based care providers, who total 3.8 million professionals, make up most of the early care and education workforce. Many home-based providers are also small-business owners and must manage the responsibilities that come with running a business (e.g., banking, purchasing supplies and cleaning, regulatory requirements) in addition to their caretaking duties."

Recommendations

The following are interim recommendations from one year of leadership team convening.

1. Fund educators:

- Support programs that make it less expensive to become a teacher.
- Encourage more people to become teachers and charge CDHE with assessing strategies to retain teachers.

2. Expand credit for prior learning opportunities:

- Continue to develop tools for learners to understand how what they have learned outside of class, including military service, can count for college credit and/or teacher licensure.
- Build connections between colleges and universities so courses and experiences count toward a degree even when students transfer from one institution to another.

3. Make it easy for experienced teachers to develop additional skills:

- Explore whether serving as a teacher mentor and/or having a teacher mentor helps with educator retention.
- Find clear ways for teachers to develop leadership skills.

Next Steps

The Education Stackable Credentials Leadership Team will continue to convene to work on the following:

1. Assess the current education stackable credentials pathways. Revise as needed and identify other potential pathways or microcredentials.
2. Continue to develop course crosswalks and credit for prior learning opportunities.
3. Interview learners and create learner journeys using qualitative and quantitative data to identify additional opportunities and challenges.
4. Continue to support alternative pathways to teacher licensure via apprenticeship.

Summary Recommendations

Through these many months of engagement with stakeholders across state agencies, advocacy groups, employers and learners, both strengths and challenges have come to light. In this final section of the report, several recommendations are highlighted stemming from the work.

Employer Engagement and Public/Private Partnerships

- The state has made steady progress in creating pathways that lead to good jobs. Getting employers involved is a big win, but the state needs to continue engaging with the private sector. This means working together to make sure the skills people learn match what employers are looking for.
- To keep these pathways strong, involve employers through advisory boards and sector partnerships. Also, use tools like My Colorado Journey's Careers in Colorado to make these pathways even better and more accessible to learners.

Centering the Learner

- Creating paths for learning and work in areas like behavioral health, cybersecurity and education are tricky. Even the usual path from school to college to work has its challenges. People often don't know what experiences count for college credit or how their skills can help them in a job.
- Make things clearer for learners. Here are a few ideas:
 - Focus on giving credit for what people already know, including military experience.
 - Make it easier for people to plan their careers and education by providing a one-stop shop for information on funding, scholarships and career paths.
 - Support learners in both K12 and adulthood with personalized plans and regional navigators to help them find their way.

Boosting Paid Work-based Learning Experiences

- Learning on the job through experiences like apprenticeship are a great way for people to earn and learn at the same time. Programs that support career development and provide wages are a win for the learner/earner and they allow employers to teach the exact skills they are looking for.
- Coordinating apprenticeship programs to count for college credit helps learners move up in their careers.

Encouraging Positive Changes

- The state should adopt the Quality and In-demand Non-degree Credential Framework. This makes it easier for learners and employers to know what's valuable.
- The Career Development Incentive Program, the WIOA Eligible Training Provider List and other programs that support people in pursuing non-degree credentials should use this framework to guide learners toward valuable credentials.

Longitudinal Data to Evaluate Outcomes

- To understand if these pathways are working, there needs to be a way to track what happens to learners over time. Using a system that follows people from their first credential through their careers. This shows the true value of short-term credentials and how they impact things like wages over time.



Next Steps & Conclusion

This report provides information on the stackable credential pathways work to date. In the coming months, the Colorado Department of Higher Education will complete the buildout of four stackable credential pathways in healthcare and software development. These pathways should be finalized by June 30, 2024. Additionally, work will continue in the areas of behavioral health, cybersecurity and education in the areas described above. While the final report for progress and outcomes related to SB22-192 is not due until December 2025, the department plans to release all 10 stackable credential pathways in a second interim report by January 2025. This follow-up report will include data collected from institutions to measure the total number of credits, credentials, certificates and professional licenses earned in each pathway at each institution.

Appendices

Appendix A: Steering Committee Charge and Membership

Appendix B: Stackable Credential Pathways Leadership Team Charge and Membership

Appendix C: Quality Definition and Evaluation Team Charge and Membership

Appendix D: Quality and In-demand Non-degree Credential Evaluation Framework

Appendix E: Learner Voice Summary Report

Appendix F: Cybersecurity Foundational Competencies

Appendix A: Steering Committee Charge and Membership

This is an invitation to serve on the Colorado Department of Higher Education's Stackable Credential Pathways Steering Committee. Over the next two years, we will be building the infrastructure for high-quality credential pathways across five high-need industries. Our goal is to provide better maps for workers and learners so that they may more seamlessly:

- Enter the workforce at an entry-level position;
- Earn college credit for prior learning for high-quality industry certifications, apprenticeship experiences, or other work-based learning experiences to reduce cost and accelerate time to completion of the next credential needed for career growth;
- Acquire new or deeper knowledge, skills, and competencies through additional education and/or training coupled with their work experience to build to a next-level position with higher earnings and/or additional benefits; and
- Continue to stack their credentials and work-based learning to acquire additional industry certifications, longer-term certificates, an associate degree and/or a bachelor's degree to continue to climb the career ladder and unlock higher-paying positions that often require additional education.

Colorado Department of Higher Education's Stackable Credential Pathways Steering Committee will help guide the stackable credentials work across five industries of critical importance to the state of Colorado. Steering Committee member roles and responsibilities include:

- Helping industry project teams set direction, scope, goals, and timelines
- Supporting industry project teams in accomplishing milestones according to their project plans
- Advocating for the stackable credential pathway work wherever and whenever possible
- Building a high-quality credential evaluation framework to ensure the inclusion of quality credentials along each pathway
- Determining project key performance indicators to measure success
- Brainstorming project strategies and problem-solving ideas
- Promoting effective and regular communication to senior leadership and stakeholders about project progress

The Steering Committee meets every two months and will receive regular updates on the work of the industry project teams between meetings.

Steering Committee Membership Organizations

ActivateWork	Credential As You Go
Adams State University	Denver Public Schools
Alliance for Community and Justice Innovation	Emily Griffith Technical College
Attainment Network	Envision Strategy Group
Aurora Public Schools	Fremont Economic Development Council
Banner Health	Front Range Community College
CareerWise Colorado	Serve Colorado
CDLE Office of the Future of Work	Health Care Policy and Financing
Children's Hospital Colorado	Innovate + Educate
CiviCo	Jobcase, Inc.
College Board	Metropolitan State University Denver
Colorado Business Roundtable	Mi Casa Resource Center
Colorado Community College System	Office of Information Technology
Colorado Department of Education	Pickens Technical College
Colorado Department of Higher Education	Pikes Peak State College
Colorado Department of Labor and Employment	St. Vrain Valley School District
Colorado Mesa University	Star Harbor Academy
Colorado Mountain College	Teach Colorado
Colorado State University	Technical College of the Rockies
Colorado State University Global	University of Colorado Boulder
Colorado Succeeds	University of Colorado Colorado Springs
Colorado Workforce Center-Rural Workforce	University of Colorado Denver
Colorado Workforce Development Council	University of Northern Colorado
Colorado River BOCES	

Appendix B: Stackable Credential Pathways Leadership Team Charge and Membership

Overview of Leadership Team Roles & Responsibilities:

The Stackable Credential Pathway Industry Leadership Teams were established to develop two high-quality, stackable credential pathways in five industry areas. The individuals serving on the leadership teams represent state and government agencies, educational institutions including secondary and post-secondary institutions, employers and workforce partners, and non-profit organizations dedicated to improving accessibility and transparency across the education and workforce ecosystem.

The leadership teams are subject matter experts committed to improved accessibility, transparency, and coherence across the education and workforce ecosystem. Industry leadership team member roles and responsibilities include:

- Developing a holistic understanding of the current education and workforce realities, including strengths, challenges, and opportunities for innovative solutions
- Employing a high-quality credential evaluation framework to ensure the inclusion of quality non-degree credentials along each pathway
- Developing two stackable industry credential pathways that include high-value non-degree credentials that alone lead to high-value jobs and that can stack into additional credentials that lead to higher-wage jobs in the industry
- Ensuring the knowledge, skills, abilities, and competencies embedded in each non-degree credential included in the pathway are crosswalked to course learning outcomes, courses, and/or postsecondary certificates and degrees to allow for credit for prior learning so learners/earners maintain momentum on their way to the next stackable credential and their next career advancement opportunity
- Advocating for the stackable credential pathway work wherever and whenever possible
- Determining project key performance indicators to measure success
- Brainstorming project strategies and problem-solving ideas
- Supporting effective and regular communication to the Stackable Credential Pathways Steering Committee and other stakeholders about the pathway process

Industry leadership teams meet every month.

Leadership Team Membership Composition by Organization

Behavioral Health Leadership Team Composition

Alliance for Community and Justice Innovation	Colorado Workforce Development Council
Aponi Partners, Inc.	Community College of Aurora
Arapahoe Community College	Community College of Denver
Attainment Network	Credential As You Go
Axis Health System	CSU Pueblo
Banner Health/NOCO Sector Partnership	Denver Public Schools
CareerWise Colorado	Envision Strategy Group
Centura/CommonSpirit Health	Firefly Autism
Colorado Behavioral Health Administration	Front Range Community College
Colorado Behavioral Health Council	Lamar Community College
Colorado Community College System	MSU-Denver
Colorado Department of Education	NASW-CO
Colorado Department of Health Care Policy and Financing	Pikes Peak State College
Colorado Department of Higher Education	Poudre School District
Colorado Department of Labor and Employment	Pueblo Community College
Colorado Department of Public Health and Environment	Summit Stone Health
Colorado Mesa University	Trinidad State College
Colorado Mountain College	University of Colorado Denver
Colorado Rural WorkForce Consortium	University of Northern Colorado
Colorado Society of School Psychologists	Valley-Wide Health Systems, Inc.
Colorado State University	
Colorado Succeeds	

Education Leadership Team Composition

Adams City Middle School	Community College of Denver
Adams State University	Credential As You Go
Alliance for Community and Justice Innovation	Denver Public Schools
Arapahoe Community College	Efshar Project
Association for Advancing Quality in Education Preparation	Front Range Community College
Attainment Network	Goodwill of Colorado
Aurora Public Schools	Higher Education Resource Services
Calhan School District RJ-1, TASCC LLC Ear	Maryville University
CareerWise Colorado	MyLifeTrek, Inc.
CiviCO	Pikes Peak State College
Colorado Christian University	Poudre School District
Colorado Community College System	Pueblo Community College
Colorado Department of Early Childhood	Red Rocks Community College
Colorado Department of Education	St. Vrain Valley School District
Colorado Department of Higher Education	Southern Ute Indian Tribe
Colorado Department of Human Services	Star Harbor
Colorado Mesa University	TEACH Colorado
Colorado Mountain College	University of Colorado Boulder
Colorado River BOCES	University of Colorado Colorado Springs
Colorado School of Mines	University of Colorado Denver
Colorado State University	University of Denver
Colorado State University Pueblo	University of Northern Colorado
Colorado Succeeds	
Colorado Workforce Center-Rural Workforce	

Cybersecurity Leadership Team Composition

ActivateWork	Credential as You Go
Attainment Network	DataNexus
BurstIQ	Denver Public Schools
Canvas	Front Range Community College
CareerWise Colorado	Grand County Library District
College Board	Innovate + Educate
Colorado Christian University	Lockheed Martin
Colorado Community College System	Microsoft
Colorado Department of Higher Education	Pikes Peak State College
Colorado Mountain College	Red Rocks Community College
Colorado State University	Spark Mindset
Colorado State University Global	University of Colorado Denver
Colorado Succeeds	University of Northern Colorado
Colorado Technology Association	Western Union
Colorado Workforce Development Council	
Community College of Denver	

Healthcare Leadership Team Composition

Aims Community College	Colorado Succeeds
Arapahoe Community College	Colorado Workforce Center--Rural Workforce
Banner Health	Colorado Workforce Development Council
Burst IQ	Community College of Aurora
CareerWise Colorado	Community College of Denver
Colorado Commission on Family Medicine	Credential As You Go
Colorado Community College System	Envision Strategy Group
Colorado Community Health Network	Front Range Community College
Colorado Department of Education	Hands 2 the Future
Colorado Department of Healthcare Policy and Financing	Innovate + Educate
Colorado Department of Higher Education	National Institute for Medical Assistant Advancement
Colorado Department of Human Services	Pikes Peak Community College
Colorado Department of Labor and Employment	Poudre School District
Colorado Department of Public Health and Environment	Pueblo Community College
Colorado Department of Regulatory Agencies	Technical College of the Rockies
Colorado Mesa University	The Attainment Network
Colorado Mountain College	Trailhead Institute
Colorado Safety Net Collaborative	University of Colorado Anschutz
Colorado State University	University of Northern Colorado
Colorado State University Global	

Software Developer Leadership Team Composition

Attainment Network	Ibotta
Blavity, Inc.	Indigo Education Company
CareerWise USA	Innovate + Educate
Colorado Christian University	Lockheed Martin
Colorado Community College System	Microsoft
Colorado Department of Higher Education	Randa Solutions
Colorado State University	Red Rocks Community College
Colorado State University Global	Serve Colorado
Colorado Succeeds	Spark Mindset
Credential as You Go	University of Colorado Boulder
DataNexus	University of Colorado Denver
Denovo	Western Union
Denver Public Schools	

Appendix C: Quality Definition and Evaluation Team Charge and Membership

SB22-192 Stackable Credentials Common Definitions Working Group Charge

This group is charged with developing a framework for evaluating the value of non-degree credentials (NDCs), their component knowledge, skills, and competencies. Together we will develop a common definition of a quality non-degree credential for Colorado to provide greater clarity in this space. We will build from existing models such as those by the National Skills Coalition and Education Strategy Group, as well as work that was previously done by state agencies to develop a common definition.

Participant Organizations and Institutions

Adams State University

Attainment Network

CareerWise Colorado

Colorado Community College System

Colorado Department of Education

Colorado Department of Higher Education

Colorado State University

Colorado Workforce Development Council

Colorado Succeeds

Members of Colorado Department of Education's Launch Equitable Pathways Initiative

Metropolitan State University Denver

University of Colorado Colorado Springs

Appendix D: Learner Voice Summary Report and Takeaways

The Attainment Network granted CDHE \$2,500 to support the addition of learner voice and perspectives to the stackable credential pathways work. This project provided up to a \$500 stipend to five adult learners/earners in the following fields: behavioral health, cybersecurity, education, healthcare, and programming/developer. These learner/earners engaged with CDHE's stackable credential pathways industry leadership teams throughout the summer of 2023 to share their experiences navigating the K12, postsecondary, and workforce ecosystem and provided important learner voice and feedback in our attempts to build better, more connected, more transparent, and more learner-centered navigation through the complex education and workforce landscape. The objective of the stackable credential pathways work is to guide Coloradan learners/earners to family-sustaining wage jobs. The summer 2023 was an ideal time to engage with learners/earners as we were six months into our pathway development and needing to hear what challenges we had yet to address and what additional opportunities existed to create greater and more equitable access to the stackable pathways we were building. Importantly, these learners' voices have helped to ensure greater success across the various transitions between education/training and workforce.

Participants joined the stackable credential pathways initiative steering committee and industry leadership team meetings in June and July to learn about the pathways work to date and lend their voice to the continued buildout of pathways to ensure improved quality, utility, and relevance. Before this engagement, participants engaged in four think tank meetings with CDHE, Colorado Succeeds, and Attainment Network leaders. These think tanks were designed to assist learner participants in getting to know CDHE staff and one another so they would feel more comfortable sharing their learning journeys. During these think tanks CDHE staff learned about challenges faced, opportunities for improved navigation and supports, effective marketing/communication strategies, and credit for prior learning considerations/recommendations from the learner participants. After the summer, the majority of the learner participants offered a learner voice session at the Attainment Network's Career Connected Pathways Conference in September.

The original project plan included the following activities:

1. Learner Participant Think Tanks—Participants engaged in up to four scheduled think tanks in June and July 2023. (Think Tank Dates: June 26, July 10, July 17, and July 24)
2. Learner Participant Stackable Credential Pathways Leadership Team Participation— Participants engaged in up to two industry-specific stackable credential pathways Leadership Team meetings in June and July
3. Learner Participant Stackable Credential Pathways Steering Committee Panel Participation—Participants engaged in a Learner Voice Panel during the July 2023 Stackable Credential Pathways Steering Committee meeting. (Steering Committee Date: July 21)

In addition to these originally planned activities, we were able to offer learner participants the opportunity to participate in a learner voice session at the Attainment Network's Career Connected Pathways Conference in September. In addition to the five original learner participants, we added the learner from Colorado Succeeds who had originally served as a learner mentor through the Think Tanks to the learner voice lineup at the conference. This learner had left his position at Colorado Succeeds and returned to full-time student status in the fall, and we were able to compensate him as well as other learners for their participation in the conference session through this grant. This opportunity was afforded due to having leftover stipend dollars because not all participants were able to participate in all originally planned engagement activities. This additional use of funds

was incredibly beneficial, as the learner voice session was well received by session attendees, and the power of the learners' stories and recommendations was underestimated at the start of the project. We were grateful to have an opportunity to amplify their voices, experiences, and recommendations beyond the stakeholder groups engaged in the stackable credential pathways work.

CDHE staff collaborated with Colorado Succeeds and the Attainment Network in this project. During our think tanks, Larry Blackshear from Colorado Succeeds served as a learner mentor, sharing his education and career journey with learners to break the ice, reaffirm the safe space of the work, and model how to tell their story. Michelle Camacho-Liu from the Attainment Network joined the think tank sessions and facilitated a conversation during one think tank about the most effective marketing and communication strategies that we might use regarding stackable credential pathways. The Attainment Network was also a fantastic partner and worked with us to find scholarship funding for some of our learner participants as well as CDHE staff to attend the Career Connected Pathways Conference to present the learner voice session.

We consider this project a resounding success. There are positive impacts for both the Stackable Credential Pathways initiative as well as for the learner participants.

The education and career journeys that the learner participants shared this summer have informed the stackable credential pathways that we have built. Additionally, the recommendations for improved navigation that learner participants shared have informed both the industry-specific recommendations as well as the summary recommendations that are built into the interim report.

We hope that the five learners who participated in this project feel the power of their voice and lived experience. We believe that one positive impact of this work is to validate for the learner participants, as well as other learners across the state, that non-linear paths to and through education and career are the norm, that the challenges faced, and recommendations made have been heard and will inform better policy and practice in Colorado in coming years.

Appendix E: Cybersecurity Foundational Competencies

The following are competencies identified as essential for success in entry-level cybersecurity jobs. These build upon the list of Essential Competencies important for success in cybersecurity or software developer jobs.

The list (which is an expansion of CareerWise’s cybersecurity competencies) includes the cybersecurity concepts and practices that should be understood at a basic level as well as a range of jobs/competencies that use cybersecurity practices. It is not expected that an entry-level employee will be competent in all of these. However, they should have a basic understanding of each of these and also be ready to apply their competencies (what needs to be secured, how to secure it, and what tools are available to help) on everyday tasks in a job that covers one or a few of these areas. Which one(s) will depend on the competencies/interests of the job seeker as well as the jobs that are available in their local area (which should be reviewed for relevance both by the students and educators). As workers progress in their careers, they should continue to deepen their expertise in one or a few of these areas, based on job requirements, while also furthering their knowledge and experience in all of these areas.

- Security Information and Event Management (SIEM) and Security Orchestration Automation and Response (SOAR) - understands SIEM and SOAR, their interaction, and can use at least one tool (Splunk, LogRhythm, etc.) to complete SIEM and SOAR activities.
- Traffic monitoring - monitors traffic/logs and detects security issues that require immediate action (taking action as appropriate) and potential malicious activity for further review, including an understanding of different security profiles/priorities organizations could have.
- Threat vulnerability, detection, prevention, and mitigation - Uses and configures tools (such as Nessus) and technologies to detect, mitigate, and prevent potential threats. Understands the basics of IT threat, attack, vulnerability (social engineering, phishing, S3 buckets, brute force, malware, data exfiltration, etc.), and assessment.
- Threat modeling – Able to characterize potential attacks and areas that would be vulnerable to prepare for and mitigate attacks. Thinking through this helps them understand why they do their work and why it is important.
- Network and Firewall Maintenance and Management - Installs, configures, tests, operates, maintains, and manages networks and their firewalls including hardware and software that permit sharing and transmission of information.
- Security Processes, Protocols, and Documentation - Uses organizational processes, protocols, and documentation to monitor and respond to security incident and event management alerts.
- Security Measures – Understands key security approaches such as endpoint security, zero trust security, and defense in depth.
- Confidential Information Handling - Ensures the privacy of sensitive data at all times. Understands the need and potential approaches to balance confidentiality, integrity, and availability of data (called the CIA Triad) under the protection of an information security structure as part of an overall governance, risk, and compliance strategy.
- Access Controls - Consistently performs job functions with the mindset of who can and should access data and systems.
- Server Security - Installs, configures, troubleshoots, and maintains server configurations to ensure their confidentiality, integrity, and availability; also manages accounts, firewall configuration, and patch and vulnerability management.
- DevSecOps - Uses knowledge of secure coding (secure software development) practices to contribute to maintaining code security. Understands the basics of DevSecOps, such as the code development pipeline, how automation is used, and deployment technologies and processes.

- Cloud Security - Installs, configures, troubleshoots and maintains cloud configurations to ensure their confidentiality, integrity and availability.
- Data analysis and basic software development – An understanding of how to store/retrieve and support the analysis of data (such as user/network logs). An understanding of how to develop software, such as the use of SQL, how to interact with APIs, and programming/scripting languages to do so.

Additional competencies that will be valued by some employers include knowledge of desktop/operating systems, generative AAI, and knowledge of how to use VR/Innovative Tech as a step towards learning the basics. There are also specialized areas within cybersecurity, such as penetration testing, audit/compliance digital forensics, and cryptography, that are highly valued but are usually skills that go beyond entry-level jobs, instead being added later to advance a career.

Some additional thoughts on career advancement are:

- Different industries (government, healthcare, manufacturing, etc.) and different specialty areas (auditing, forensics, etc.) have different training and certification paths that support advancement in a career. Therefore, it is important to explore and understand which training and certification paths are important to match the career interests of a cybersecurity employee.
- CompTIA provides the following visual of certification pathways (<https://partners.comptia.org/docs/default-source/resources/08314-it-certification-roadmap-nov2020-update-8-5x11-online>) and SinecureLife provides the following (https://www.reddit.com/r/cybersecurity/comments/e23ffz/security_certification_progression_chart_2020/?utm_source=share&utm_medium=web2x), both of which some people find to be helpful to understand how credential fit into jobs and career progression. In addition, MyColoradoJourney.com and cyberseek.org have career pathways and cyber.org (<https://cyber.org/career-exploration/cyber-career-profiles>) has profiles of specific jobs that can be held within cybersecurity.



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