OCT **2018**

STEM Dual Enrollment

MODEL POLICY COMPONENTS

JENNIFER ZINTH

EDUCATION COMMISSION
OF THE STATES
Your education policy team.

> Although still relatively small in number, the STEM workforce has an outsized impact on a nation's competitiveness, economic growth, and overall standard of living. STEM workers drive innovation (as measured by patents), and they have the flexible skills needed for the modern economy. At a time when firms across the economy cite difficulty matching skilled workers to job openings, the ability of STEM workers to adapt to new circumstances and processes makes them highly sought after. For workers, STEM jobs are linked to lower unemployment and higher wages, regardless of educational background or other factors. Strengthening the workforce training pipeline into STEM jobs can provide benefits to both businesses and workers.
>
> United States Department of Commerce

A drumbeat of statistics provide support for increasing the number of students prepared for jobs in STEM — science, technology, engineering and math — fields. For one, STEM occupations are projected to increase by 8.9 percent between 2014 and 2024, compared with a 6.4 percent increase in non-STEM occupations during the same time.[1] And the benefits that accrue to individuals who earn degrees and/or work in STEM occupations include higher wages and lower unemployment rates than those in other fields.[2]

What Is STEM Dual Enrollment?

For the purposes of this Special Report, STEM dual enrollment includes any of the following types of postsecondary courses offered to high school students:

1. Traditional academic coursework in STEM disciplines, defined here as science, technology, engineering, math, computer science or medicine.
2. Career and technical education (CTE) coursework that applies knowledge from STEM disciplines.
3. Integrated or interdisciplinary coursework in STEM disciplines that may be either pure or applied.

In spite of the well-paying, in-demand jobs that many STEM degrees can lead to, just 18 percent of the 1.9 million bachelor's degrees awarded in the U.S. in 2015-16 (the most recent data available) were in STEM subject areas.[3] Given that about 5 percent of workers with a non-STEM undergraduate degree work in a STEM field, a large proportion of a state's workforce is unlikely to secure jobs in these growing occupational areas without first generating and encouraging a student body interested in science, technology, engineering and math. One option for exposing students to these fields and putting them on a pathway toward a degree is dual enrollment — or the opportunity to take college-level coursework (for college credit) while in high school.

All other factors being equal, research shows that students who dually enroll are more likely than their peers who do not dually enroll to earn a high school diploma, matriculate in a postsecondary institution and complete a credential or degree.[4] Some research also suggests that dual enrollment participation may encourage students who did not have postsecondary aspirations to pursue postsecondary education after high school.[5] Dual enrollment research also points to particularly positive program outcomes for CTE concentrators, low-income students and students of color.[6] For example, one study of **Texas** students found that those who dually enrolled were 2.28 times more likely to matriculate in college after high school as students of similar demographics who weren't dually enrolled.[7] An analysis of **Florida** dual enrollees found low-income and male students benefited more from dual enrollment participation than their peers.[8]

While there is not an established body of research drawing a correlation between a student's choice of dual enrollment courses and the student's choice of major when the student subsequently matriculates, research documenting outcomes of such STEM career pathway programs as Project Lead the Way suggests that students selecting into such course sequences are more likely than their peers to pursue STEM degrees.[9]

To ensure high school students statewide have equitable access to high-quality STEM dual enrollment programs, a comprehensive policy approach should include the following components:

ACCESS

- Evaluation and alignment of high school and postsecondary curricula.
- Use of multiple metrics to identify students for recruitment.
- Aggressive student and parent outreach and student recruitment, including through STEM career awareness and exploration in the early and middle grades.
- Flexibility in program eligibility requirements.
- Academic supports, as needed, before and during course participation.
- Non-academic supports, as needed, before and during course participation.

FINANCE

- Student-borne tuition and other participation costs eliminated or substantially defrayed, at a minimum for low-income students.
- District and postsecondary institution access to financial supports, as needed, to defray program start-up infrastructure and delivery costs.

PROGRAM QUALITY

- Efforts to increase the number of qualified instructors.

TRANSFERABILITY

- Dual enrollment credit evaluated in the same manner as other transfer credit — and awarded appropriately — provided measures of quality are ensured.

These policy components are intended to be high-level and applicable to the diverse array of STEM dual enrollment programs, both academically oriented and CTE-oriented.

In addition, because all four policy areas are interrelated, these components should be viewed as a comprehensive package of policies for state adoption rather than a menu from which states may choose without compromising program availability or quality. For example, access and participation are compromised if funding strategies create disincentives for students, districts or institutions. And in principle, all the policy areas can have a significant impact on program access.

There is no single cookie-cutter policy incorporating all 10 elements that all states should adopt. Rather, this report proposes diverse examples states may consider that accomplish the goals set forth in each policy element. This paper defines and provides the rationale for including each of the model components within a comprehensive state STEM dual enrollment policy and identifies examples of state provisions that align with each component.

Access

Evaluation and alignment of high school and postsecondary curricula

If the rigor of students' high school coursework has not prepared them for readiness and success in dual enrollment coursework, students will not be able to meet course eligibility requirements, even when some flexibility is offered. By aligning the instruction and rigor of high school curricula with what is expected in postsecondary coursework, schools and districts can better place students on a trajectory for readiness for STEM dual enrollment classes.

In **Illinois**, for example, the Postsecondary and Workforce Readiness Act calls for a state panel of high school and postsecondary educators and administrators — with input from private sector employer representatives — to create three types of transition courses that, upon successful completion, guarantee student placement into different types of postsecondary math courses.[10] These three transition courses are geared toward three types of students: (1) Students who may be on a STEM degree trajectory and whose first college course will be algebra I or higher; (2) students in technical programs who will apply math in career settings; and (3) students who may be pursuing a liberal arts program, who are likely to enroll in quantitative literacy and/or statistics upon college entry. Transitional math courses must be co-delivered and co-developed by high school and community college instructors, as defined by a partnership agreement. Instruction may be

New Hampshire's STEM Dual Enrollment Program

New Hampshire legislation passed in 2017 established the nation's only STEM dual enrollment program. Among other things, the legislation:

- Permits 11th- and 12th-graders to enroll in dual and concurrent enrollment courses offered by the Community College System of New Hampshire (CCSNH).
- Directs the state to pay up to $250 to a CCSNH institution for each approved course completed and requires the institution to accept such amount as full payment for course tuition.
- Requires local boards to adopt policies governing the dual enrollment program, and requires that policies comply with the standards for accreditation and program development established by the National Alliance for Concurrent Enrollment Partnerships.

delivered either through standalone courses, integrated courses or competency-based learning systems.[11] By June 30, 2019, the Illinois State Board of Education and the Illinois Community College Board must jointly establish a phased implementation plan and benchmarks that lead to full statewide implementation of transitional mathematics instruction in all school districts.[12]

Use of multiple metrics to identify students for recruitment

While standardized test scores or cumulative GPA may be an accurate predictor of STEM dual enrollment success for some students, other students who could succeed in a STEM dual enrollment course may fall short of these objective readiness metrics. For this reason, standardized test scores or GPA should not be a single or inflexible measure to identify students, but one of multiple indicators that may include course-taking patterns or improvement in GPA over time.

Rethinking Dual Enrollment to Reach More Students identifies alternate criteria that states might propose in policy for districts and schools to identify prospective students, particularly those whose test scores or GPA might mask the ability to succeed in a STEM dual enrollment course.

In **North Carolina**, the results of student diagnostic tests — such as PSAT — are used to identify students prepared for success in advanced courses, but statute also authorizes schools to identify students based on other criteria to increase student access to those courses.[13]

Flexibility in program eligibility requirements

Multiple measures for identifying students for program participation may not go far enough. Students who fall just below minimum eligibility criteria for dual enrollment courses may be able to successfully complete coursework with modest to moderate academic supports, so state policies providing some flexibility on these eligibility criteria may increase diverse student participation.

Minnesota's 2018 annual report to the legislature on advanced course-taking encourages the state to take steps to enhance the participation and success of students of color in concurrent enrollment. The report recommends that eligibility criteria not rely solely on such indicators of overall academic standing as GPA or class rank but include multiple measures of a student's ability to succeed in a postsecondary course or subject — such as performance in previous related courses.

A 2017 legislative change in **Ohio** affords some flexibility in dual enrollment eligibility requirements by requiring programs to consider GPA or a school staff recommendation when a student scores within one standard error of measurement below the statewide remediation-free threshold for the ACT, SAT or other approved assessment exam.[14]

Additionally, Ohio secondary schools and postsecondary partners can apply for a waiver from the requirements of the state's dual enrollment program, College Credit Plus, if they provide innovative programming to exclusively address the needs of underrepresented student groups and satisfy other criteria set forth in regulation.[15] While the waiver may apply to any program requirements, it should be noted that all 2018-19 requests were for waivers from eligibility requirements. (Support services are provided to students who may not be college-ready based on assessment scores.)[16]

Aggressive student and parent outreach and student recruitment, including through STEM career awareness and exploration in the early and middle grades

Twelve states require all high school students and their parents to be notified of the availability of dual enrollment courses. However, this notification may not be enough for students who have the ability to succeed in STEM dual enrollment coursework but don't see themselves pursuing STEM degrees or careers. To counter student self-perceptions that may keep students from participating in STEM dual enrollment, state policies should go beyond waiting for students to self-select into STEM dual enrollment courses. They can urge high schools, districts and postsecondary partners to conduct aggressive student recruitment and parent outreach, targeting females and underrepresented students of color.

Research suggests that most students make decisions about their STEM abilities before high school.[17] As a result, these outreach and recruitment strategies should start in the middle or even elementary grades with various STEM awareness activities laying the groundwork for interest in STEM coursework, including dual enrollment, by the time students reach high school. Such early exposure is critical, before students decide "Students like me aren't good at math," or "Girls don't do science." Other strategies include providing all students and parents with basic information on STEM academic and career pathways and tapping additional staff to connect students with potential careers. States can also leverage state and local business-education partnerships to provide all students and parents with information on the benefits of certain STEM credentials and the wages and education levels associated with high-demand jobs in STEM fields.

Academic supports, as needed, before and during course participation

Academic supports before and/or during course participation may be critical to student success in STEM dual enrollment courses because they can increase the number and diversity of high school students who meet eligibility criteria — which may be more rigorous than those for non-STEM dual enrollment coursework. Academic supports during participation can also make the difference between passing and failing a course. States may consider any number of approaches for delivering such academic supports:

AVID (or similar programs), starting as early as ninth grade. Advancement Via Individual Determination is a set of supports for at-risk learners to achieve college readiness that includes teacher and principal professional development and curriculum. **Virginia** requires any local board adopting the AVID model to comply with a number of statutory requirements. One requirement is that participating boards develop an agreement with a postsecondary institution near the district to provide relevant support services that include access to advanced coursework and student tutorials.[18]

COLLEGE SUCCESS COURSES, which provide students with key academic skills and knowledge of college practices. Some states explicitly offer such courses through dual enrollment programs, either as credit- or non-credit courses. For example, the **Idaho** Digital Learning Academy offers Boise State University's Dual Credit Career and Life Planning and Dual Credit High School to College Transition, for which there are no course prerequisites.

PREPARATION FOR PLACEMENT TESTING. Many programs to prepare high school students to sit for postsecondary placement exams are local. However, some programs are available through statewide platforms. For example, the **Nevada** System of Higher Education has purchased a NROC Project membership, which gives all 11th- and 12th-graders access to customized math readiness tools to address their areas of need.

SUMMER BRIDGE OR SIMILAR PROGRAMS. Although summer bridge programs are typically offered to rising college freshmen to reinforce academic behaviors and skills necessary for postsecondary success, states can develop summer bridge programs designed specifically for rising 11th- and 12th-graders to provide academic supports needed for success in STEM dual enrollment coursework, in addition to the experience of being on a postsecondary campus.

COURSES DELIVERED IN A COREQUISITE MODEL. In corequisite model courses, students concurrently take credit-bearing, college-level coursework and supplemental remedial instruction. Although state dual enrollment policies at this time do not explicitly speak to delivery of entry-level courses through a corequisite model, offering math to entry-level STEM dual enrollment students through a corequisite model may enhance course success and facilitate subsequent STEM dual enrollment course-taking for students whose achievement falls just short of college-ready on objective readiness metrics.

DEVELOPMENTAL COURSEWORK IN MATH THROUGH DUAL ENROLLMENT PROGRAMS BEFORE MATH-INTENSIVE STEM COURSES. Absent the delivery of dual enrollment coursework through a corequisite model, offering aspiring dual enrollment students developmental coursework to ready them for credit-bearing STEM courses, particularly in math-intensive disciplines, is another approach. In 2016, seven states allowed dual enrollment agreements to offer developmental coursework, while 22 states either had a single dual enrollment program that explicitly prohibits dually enrolled students from participating in non-credit-bearing courses or prohibits students from enrolling in remedial coursework through all dual enrollment programs.[19]

TUTORING SUPPORT. Dual enrollment policies in at least 12 states address counseling on and/or student access to support services, including tutoring support.[20] **Iowa,** for example, requires institutions to ensure students have access to various support services, including tutoring.[21] In states where dual enrollment courses are largely delivered at a high school, rather than a college campus, states may consider making tutoring available online or via a hybrid model to mitigate students' logistical challenges of traveling to campus.

Non-academic supports, as needed, before and during course participation

Non-academic supports help students acclimate to the college environment, acquaint students with college processes and offer social supports and advising on post-college educational and employment options. These supports can increase the likelihood of course completion and also enrollment in subsequent STEM dual enrollment courses.

In addition to negotiating the college environment they are presently engaged in, dually enrolled students planning to matriculate in an institution other than the institution offering the dual enrollment course may need guidance on finding a college that matches their goals and needs, and completing application, financial aid and course transfer processes. Such advising needs may be particularly acute for students completing dual enrollment coursework through a community college and seeking admission to a baccalaureate-granting institution. Some examples of support are:

INTRUSIVE ADVISING. This includes assigned counselors and mandatory advising sessions. As Melinda Karp, a nationally recognized dual enrollment researcher, notes, "Students are often unaware of the non-academic help in which they are of need, particularly with regard to college know-how and clarifying their aspirations. Moreover, they may view the use of such support services as an admission that they 'do not belong in college' or that they are somehow deficient."

In **Ohio**, dual enrollment students are assigned an advisor employed by the institution, and the institution sends students their advisor's name, contact information, office hours and meeting scheduling process. The advisor and student must meet at least once before the date on which a withdrawal from a course would negatively affect a student's grade to discuss academic resources, the advisor's schedule and how to engage with faculty, among other things.[22]

MENTORING/COACHING. Mentors or coaches can provide students with informal guidance and may be recent graduates or volunteers, as opposed to licensed college counselors or advisors. In **Kentucky**, policy directs participating postsecondary institutions and secondary school partners to jointly provide advisors and/or mentors and to encourage students to confer with them as they have questions related to dual credit or academic planning.

Policymakers may also want to encourage local STEM dual enrollment programs to adopt supportive approaches for which it may be difficult to establish state policy structures. These approaches include creating a community among students through support programs for students underrepresented in STEM and access to college-level clubs or activities, either generally for STEM students or specifically for STEM students from underrepresented populations.

Finance

Student-borne tuition and other participation costs eliminated or substantially defrayed, at a minimum for low-income students

Tuition expenses can be a barrier to student participation regardless of the subject of a dual enrollment course. However, some STEM dual enrollment courses may come with higher expenses for textbooks, equipment and fees (including lab fees and fees for professional certifications or licensure exams), which can further hinder participation. States have taken diverse approaches to minimizing tuition costs for students. A few examples of financial supports are:

Tuition Reductions

APPROPRIATIONS. These range from covering a percentage of course costs to fully covering student-borne tuition costs. Under these appropriations, districts and institutions may or may not receive the same level of funding for dually enrolled students as they would from a traditional student. Under **New Hampshire's** STEM dual and concurrent enrollment pilot, the state must pay up to $250 to the community college where a student completed an approved course, and the institution must accept the $250 as full payment for course tuition.[23]

STATEWIDE REDUCED TUITION RATE. A handful of states have adopted a reduced tuition rate that applies to all dual enrollment courses offered by public postsecondary institutions. **Indiana** institutions, for example, offer select courses at $25 per credit hour for students not eligible for free or reduced-price lunch and at no cost to low-income students. Campuses in the Ivy Tech two-year college system offer free courses to all students.

TUITION WAIVERS OR SCHOLARSHIPS FOR LOW-INCOME STUDENTS. Some states explicitly prohibit dual enrollment tuition from being charged to a student eligible for free or reduced-price lunch. Other states, such as **Nebraska** and **North Dakota**, have established state scholarship programs for financially needy students, while **Hawaii** is leveraging GEAR UP funds to provide scholarships to low-income students.

Alternative Funding Streams for Non-Tuition Costs

PERKINS. Perkins funds cannot be used to individually benefit a student, so they cannot cover tuition, course fees or ACT/SAT and placement exams. However, sites may use Perkins funds to purchase textbooks or equipment if these remain the property of the secondary or postsecondary partner after the course concludes.

WORKFORCE INNOVATION AND OPPORTUNITY ACT (WIOA). Up to 25 percent of these funds may be used to support programs for in-school youth. Allowable uses may include providing student transportation to the postsecondary campus.

OPEN EDUCATIONAL RESOURCES. State-level dual enrollment policies to date are largely silent on encouraging the use of open educational resources. **Colorado** legislation passed in 2018 creates the Open Educational Resources Grant Program within the department of higher education to award funds to institutions to create and expand the use of open educational resources among institutions statewide. In making recommendations and awarding grants, the higher education commission and Colorado Open Educational Resources Council must consider whether the grant proposal would affect high-impact courses, including concurrent enrollment courses.

District and postsecondary institution access to financial supports, as needed, to defray program start-up infrastructure and delivery costs

Without dedicated financial supports, the start-up and ongoing costs to cover some STEM courses' facility and infrastructure expenses and to deliver targeted supports to students may disincentivize dual enrollment partnerships from offering costlier STEM programs. However, states can encourage creative funding approaches to offset start-up infrastructure and delivery costs.

STATE FUNDING MODELS. **Ohio's** performance funding model provides a higher weight for STEM course completion and degree attainment. High school students enrolled in STEM dual enrollment coursework generate the same additional weight as regularly matriculated students enrolled in STEM courses.[24]

PERKINS. Eligible recipients may use Perkins funds to support start-up infrastructure and delivery costs, such as upgrading equipment, labs, technology and curriculum and providing professional development. Funds may also be used toward such non-academic supports as career guidance and academic counseling, mentoring and participation in career and technical student organizations — especially efforts to increase the participation of students in nontraditional fields and students who are members of special populations. Perkins V explicitly authorizes funds to be used to support programs and activities that increase access, student engagement and success in STEM fields (including computer science and architecture) for students underrepresented in those fields.

WIOA. Funds may be used for academic supports (including tutoring and study skills training), as well as non-academic supports (such as career awareness, career counseling and career exploration services).

STEM RESOURCE CENTERS. These centers, embedded in many undergraduate institutions, offer services that may defray start-up and delivery costs. For example, the University of Southern Indiana operates two equipment lending services that loan resources at no cost to area educators. The resource center at Southern Illinois University Edwardsville offers print materials, equipment and supplies, as well as consultation for students and high school and postsecondary faculty. Regional education offices help disseminate resources from the SIUE STEM resource center to area schools.

Program Quality

Efforts to increase the number of qualified instructors

If a STEM dual enrollment course is taught by a postsecondary faculty member (either at the postsecondary campus, at the high school, online or through a blended modality), states may need to address capacity concerns in terms of the number of instructors available to teach entry-level courses for STEM majors.

That said, dual enrollment courses are increasingly being delivered by high school instructors, who must possess equivalent qualifications of a traditional postsecondary faculty member. In most instances, these minimum qualifications are a master's degree and 18 graduate hours in the subject of the course. For various reasons, many districts are challenged in identifying high school teachers, including in STEM disciplines, who meet these qualifications.[25]

In response, some states have adopted strategies focused on increasing the number of high school teachers qualified to teach STEM dual enrollment courses. Since 2013, **Indiana** has appropriated funds for the Indiana STEM Teacher Recruitment Fund, which awards grants to applicant organizations or postsecondary institutions for programs designed to increase the number of teachers in STEM subjects. In September 2017, the Indiana Commission for Higher Education awarded $5.1 million (53 percent of the STEM Teacher Recruitment Fund appropriation) to support dual credit teachers in becoming fully qualified.[26] One such grantee is the Independent Colleges of Indiana, which received $2.1 million to support STEM Teach III. Over six semesters, from spring 2018 through summer 2019, STEM Teach III will cover the cost of tuition, books and materials for in-service high school teachers enrolled in graduate-level coursework at Indiana public and private institutions to qualify them to teach STEM dual enrollment courses.

In addition, **Indiana** is applying roughly $500,000 in federal funds to offer 100-200 dual credit teachers in math, science, English and social studies graduate-level coursework at no cost, so that they may be credentialed to teach dual credit courses in accordance with regional accreditor requirements.[27]

Additionally, 2017 legislation in **Colorado** creates a grant program for eligible teachers who wish to take postsecondary coursework in order to teach computer science in public schools. The legislation authorizes the state board in awarding grants to give priority to applications for coursework or training that enables teachers to teach dual enrollment computer science courses.[28]

See the report, *Increasing the Supply of Qualified High School Teachers for Dual Enrollment Programs: An Overview of State and Regional Accreditor Policies*, for more on state approaches to increase the number of high school teachers qualified to teach dual enrollment courses.

As an alternative to increasing the number of high school teachers qualified to teach STEM dual enrollment courses, some states have also explored flexible delivery models to expand course access in areas where few high school instructors possess the qualifications to teach dual enrollment courses. These include:

STATEWIDE HUB FOR COURSES DELIVERED IN HYBRID OR INTERACTIVE VIDEOCONFERENCING. **Utah** statute establishes the Snow College Concurrent Enrollment Program to deliver a consistent two-year schedule of concurrent enrollment courses, some of which are on STEM subjects, delivered through interactive videoconferencing.[29] **Rhode Island**'s Advanced Course Network offers dual enrollment and other advanced courses through face-to-face, blended and fully online modalities.

CO-TEACHING MODELS. **Oregon**'s Sponsored Dual Credit model allows a course to be taught by a high school instructor (who does not possess the qualifications to teach the course on his/her own) working closely with a sponsoring postsecondary faculty member. The sponsoring faculty member, identified by the partnering institution, is responsible for providing orientation, oversight, training and implementation to ensure that the sponsored dual credit courses align with the institution's courses. The instructor is also responsible for communicating and collaborating with the high school teachers and other faculty in the partnership.[30] The state has also adopted Sponsored Dual Credit standards — related to curriculum, faculty, tuition and fees, students, assessment and program improvement — to ensure the quality of courses delivered through this model.

Transferability

Dual enrollment credit evaluated in the same manner as other transfer credit — and awarded appropriately — provided measures of quality are ensured

If courses meet rigorous criteria yet institutions do not award transfer credit as they would for the same course completed by a regularly matriculated student, dual enrollment's potential to reduce student costs and time to degree — and to boost the state's return on investment — is compromised. While students completing certain dual enrollment courses leading to a technical certificate will not receive transfer credit for the course at most public four-year institutions, students should be awarded credit applicable toward general education or major requirements (and not elective credit) for relevant dual enrollment courses.

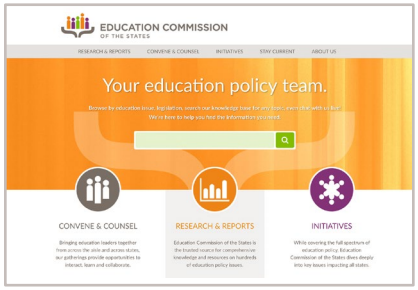
Various state models ensure the transfer of applicable dual enrollment credit. Common models include:

AGREED-UPON SET OF STATEWIDE TRANSFERABLE COURSES. The **Illinois** Articulation Initiative is a statewide transfer agreement to facilitate transfer of credits among more than 100 participating institutions in the state, which agree to accept a package of IAI general education courses in lieu of their own comparable lower-division general education requirements.

STATEWIDE COURSE-NUMBERING SYSTEM. The **Louisiana** Board of Regents must maintain a statewide course-numbering system for postsecondary and dual enrollment education in all public secondary and postsecondary institutions to facilitate program planning and the transfer of students and course credits between institutions. Equivalent courses must be guaranteed to transfer to any educational institution participating in the statewide course-numbering system.[31]

BLANKET TRANSFER OF COURSES. State policies in this category include those that limit courses students may take for dual credit to courses that have been approved for statewide transfer. **Utah** statute directs the state board of education and state board of regents to coordinate a concurrent enrollment course approval process that ensures credit awarded for concurrent enrollment is consistent and transferable to all institutions of higher education in the state.[32]

For Technical Assistance and Support



If you have questions or are looking for more resources on sound STEM dual enrollment policies, contact Education Commission of the States.

ENDNOTES

1. Ryan Noonan, *STEM Jobs: 2017 Update* (Washington, DC: Office of the Chief Economist, Economics and Statistics Administration, U.S. Department of Commerce, March 2017), https://www.commerce.gov/sites/commerce.gov/files/migrated/reports/stem-jobs-2017-update.pdf.

2. Ibid.

3. "Undergraduate Degree Fields," National Center for Education Statistics, last updated March 2018, https://nces.ed.gov/programs/coe/indicator_cta.asp.

4. Ben Struhl and Joel Vargas, *Taking College Courses in High School: A Strategy for College Readiness* (Boston: Jobs for the Future, October 2012), https://www.jff.org/resources/taking-college-courses-high-school-strategy-college-readiness/; and "Postsecondary Outcomes of Dual Enrollment Students" (board meeting, South Dakota Board of Regents, October 9-10, 2013), https://www.sdbor.edu/administrative-offices/academics/accountabilityReports/Documents/Postsecondary_Outcomes_Dual_Enrollment_Students.pdf.

Thanks to the many individuals whose input contributed to this report:

MALINDA AIELLO
Illinois Board of Higher Education

STEPHANIE BERNOTEIT
Illinois Board of Higher Education

KATIE BROWN
National Skills Coalition

BRIAN DURHAM
Illinois Community College Board

JESSICA ESPINOSA
Minnesota State Colleges and Universities

AUSTIN ESTES
Advance CTE

LARISA HARPER
Ohio Department of Higher Education

TARI LAMBERT
Indiana Commission for Higher Education

GRETCHEN LOHMAN
Illinois Board of Higher Education

KEN SAUER
Indiana Commission for Higher Education

AMY WILLIAMS
Montana University System

KATHRYN ZEKUS
Advance CTE

5. Joni L. Swanson, *An Analysis of the Impact of High School Dual Enrollment Course Participation on Post-Secondary Academic Success, Persistence and Degree Completion* (Iowa City: University of Iowa, 2008), http://nacep.org/wp-content/uploads/2010/02/2008_joni_swanson_summary.pdf.

6. Perkins V defines secondary CTE concentrators as students who complete at least two courses in a single program or program of study. Under Perkins IV, a secondary CTE concentrator was defined as "A secondary student who has earned three (3) or more credits in a single CTE program area (e.g., health care or business services), or two (2) credits in a single CTE program area, but only in those program areas where two credit sequences at the secondary level are recognized by the State and/or its local eligible recipients." See more: https://www2.ed.gov/policy/sectech/guid/cte/perkinsiv/studentdef.doc; Melinda Karp et al., *The Postsecondary Achievement of Participants in Dual Enrollment: An Analysis of Student Outcomes in Two States* (New York: Community College Research Center, Teachers College, Columbia University, October 2007), https://ccrc.tc.columbia.edu/publications/dual-enrollment-student-outcomes.html; Katherine Hughes et al., *Broadening the Benefits of Dual Enrollment* (New York: Community College Research Center, Teachers College, Columbia University, July 2012), https://ccrc.tc.columbia.edu/publications/broadening-benefits-dual-enrollment.html; Struhl and Vargas, *Taking College Courses in High School*; and Brian P. An, "The Impact of Dual Enrollment on College Degree Attainment: Do Low-SES Students Benefit?" *Educational Evaluation and Policy Analysis* 35, no. 1 (March 2013): 57–75, http://journals.sagepub.com/doi/abs/10.3102/0162373712461933.

7. Struhl and Vargas, *Taking College Courses in High School*.

8. Melinda Karp et al., *The Postsecondary Achievement of Participants in Dual Enrollment*.

9. Gary R. Pike and Kirsten Robbins, "Using propensity scores to evaluate education programs" (Paper presented at the annual meeting of the Indiana Association for Institutional Research, Indianapolis, IN, 2014).

10. 110 ILCS 148/65.

11. 110 ILCS 148/55.

12. 110 ILCS 148/65.

13. N.C.G.S.A. § 115C-174.26.

14. R.C. § 3365.03(A)(1)(b)(ii).

15. R.C. § 3365.10(A).

16. Larisa Harper, Ohio Department of Higher Education, in email message to author, August 22, 2018.

17. Robert H. Tai et al., "Planning Early for Careers in Science," *Science* 312, no. 5777 (May 2006): 1143-1144, http://science.sciencemag.org/content/312/5777/1143.

18. VA Code Ann. § 22.1-209.1:3.

19. "Students May Take Developmental/Remedial Courses Through Dual Enrollment Program," Education Commission of the States, last updated March 2016, http://ecs.force.com/mbdata/MBQuestNB2?Rep=DE1509N.

20. "Dual Enrollment: Counseling/Advising Is Made Available to Students," Education Commission of the States, last updated March 2016, http://ecs.force.com/mbdata/MBQuestNB2?Rep=DE1513N.

21. Iowa Admin. Code 281-22.4(1)(b).

22. R.C. § 3365.05(F); OAC 3333-1-65.3 (E)(2)(a).

23. N.H. Rev. Stat. § 188-E:27.

24. *Recommendations of the Ohio Higher Education Funding Commission* (Columbus: Ohio Department of Higher Education, November 2012), https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/financial/ssi/Ohio%20Higher%20Education%20Funding%20Commission%20-%20Report.pdf; *State Share of Instruction Handbook: Providing the Methodology for Allocating State Share of Instruction Funds for Fiscal Years 2018 and 2019 for Use By: University Regional and Main Campuses* (Columbus: Ohio Department of Higher Education,

revised June 2017), https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/financial/FY2018_SSIHandbookUniversity.pdf; and *State Share of Instruction Handbook: Providing the Methodology for Allocating State Share of Instruction Funds for Fiscal Years 2018 and 2019 for Use By: Community and Technical Colleges* (Columbus: Ohio Department of Higher Education, revised June 2017), https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/financial/FY2018_SSIHandbookCollege.pdf.

25. Jenny Parks, Midwestern Higher Education Compact, "Summary of Exploratory Initiative, Spring 2018: Concurrent Enrollment Teacher Credentialing," and draft Appendix A, "Exploratory Work by MHEC, Fall 2017 and Spring 2018," shared with author by email, July 16, 2018.

26. Ken Sauer, Indiana Commission for Higher Education, in email message to author, March 2, 2018.

27. "Memorandum: Option for Dual Credit Teachers — Updated Information," Scott Syverson, Indiana Department of Education, July 13, 2018, https://www.doe.in.gov/sites/default/files/news/dual-credit-update-memo-july-13.pdf.

28. C.R.S.A. § 22-97-102(4)(c).

29. U.C.A. § 53B-16-205.5.

30. "Docket item: Additional accelerated learning standards," Oregon Higher Education Coordinating Commission, June 9, 2016, https://www.oregon.gov/ode/learning-options/CTE/resources/Documents/sponsored-dual-credit-and-assessment-based-learning-standards_june-2016.pdf.

31. LSA-R.S. 17:3164.

32. U.C.A. § 53E-10-302(2)(a)(i).

AUTHOR

Jennifer Zinth leads high school policy and STEM efforts at Education Commission of the States. When not saving lives through education policy, she enjoys yoga, travel, trying out new recipes and spending quality time with her husband, son and daughter. Contact Jennifer at jzinth@ecs.org or **303.299.3689**.

ACKNOWLEDGMENT

This brief was made available by generous support from the Joyce Foundation.