Date of Hearing: April 25, 2018

ASSEMBLY COMMITTEE ON EDUCATION
Patrick O'Donnell, Chair
AB 2186 (Thurmond) – As Amended April 17, 2018

SUBJECT: Education finance: science, technology, engineering, and mathematics (STEM) teacher preparation, recruitment, and professional development: grant programs

SUMMARY: Appropriates $152 million to provide one-time grants to local educational agencies (LEAs) to fund the following initiatives: 1) professional learning opportunities in STEM subjects; 2) locally-devised solutions to STEM teacher shortages; 3) high-quality STEM teaching and learning opportunities for pupils living in rural areas; 4) integration of computer science education into academic programs; 5) studies to examine the feasibility of assessing students in science prior to 5th grade and the amount of instructional time students receive in math and science. Specifically, **this bill**:

1) Appropriates $152 million to create the following programs:

    a) $50 million to establish the Early STEM Professional Learning Grants Program, to support professional learning opportunities in STEM subjects for TK-8 teachers, principals, and school leaders.

    b) $50 million to establish the STEM Local Solutions Grant Program to establish new, or expand existing, locally-identified solutions that address local STEM teacher shortages.

    c) $20 million to create the STEM Education for Rural Schools Grants Program to support the development of high-quality STEM teaching and learning opportunities for students in rural areas.

    d) $30 million to create the Computer Science Education for Schools Grants Program, to integrate computer science into the K-12 academic program.

    e) $2 million to execute a study that would determine the feasibility of assessing students in science prior to 5th grade, and a survey to determine the amount of instructional time that all students receive in math and science.

Early STEM Professional Learning Grants Program

2) Appropriates $50 million to the California Department of Education (CDE) to establish the Early STEM Professional Learning Grants Program, for the purpose of enabling LEAs to provide TK-8 teachers, principals, technical support staff, and school leaders with high quality, evidence-based professional development opportunities that would improve STEM pedagogical knowledge, strategies, and leadership.

3) Requires that grants awarded under this program be used to develop, replicate, or expand evidence-based professional development programs that do one or more of the following:

    a) Increase teacher quality and effectiveness.

b) Improve student learning and achievement.

c) Expand access to and equity in STEM learning environments.

d) Build the capacity of STEM teams—including teachers, principals, technical support staff, and schools leaders—within LEAs.

e) Integrate technology into curriculum and instruction.

f) Increase scientific, environmental, and digital literacy of students.

g) Support the use of formative assessments that inform and improve instruction.

h) Support implementation of state standards in science, math, and visual and performing arts.

i) Evaluate programmatic impact and outcomes.

j) Disseminate promising practices.

4) Requires the CDE to:

a) Administer the Early STEM Professional Learning Grants Program on a competitive basis, in consultation with the Commission on Teacher Credentialing (CTC).

b) Allocate grant funding to eligible LEAs, including county offices of education (COEs), school districts, charter schools, and consortias of LEAs.

c) Adopt criteria that will enable CDE to assess an applicant's ability to provide professional development services. Requires that criteria include:

i. A demonstrated commitment to STEM education and professional development.

ii. A demonstrated capability to improve or update the knowledge or skills in STEM pedagogical content, strategies, and leadership for teachers, principals, and other school leaders.

iii. The availability of qualified staff.

iv. The availability of management and support staff who can ensure efficient and effective use of funding.

v. The capacity to evaluate the professional development program.

d) Give priority to applicants that demonstrate alignment to state science, math, and visual and performing arts standards in their STEM education programs.

e) Ensure grant recipients are balanced across geographic, urban, and rural regions.

5) Specifies that grant recipients may partner with community colleges, public or private four-year institutions of higher education, and professional or nonprofit organizations with STEM education expertise.

6) Requires teachers, principals, technical support staff, or school leaders to be deemed eligible for services provided through Early STEM Professional Learning Grants Program if they provide, support, or supervise STEM instruction or curriculum in grades TK-8.

7) Requires grant recipients to report to CDE, on or before January 1, 2024, the number of participants served by their program, the LEAs in which participants were employed, the grade levels taught by participants, and whether participants are still working at least 50 percent of the time in a STEM setting.

STEM Local Solutions Grants Program

8) Appropriates $50 million to the CTC to establish the STEM Local Solutions Grants Program, to provide one-time competitive grants to LEAs—including school districts, COEs, charter schools, and programs operated by a joint powers authority—for the purpose of developing and implementing new, or expanding existing, locally-identified solutions to local shortages in STEM teachers.

9) Requires grants to be up to $20,000 per teacher participant, matched by the LEA on a dollar-for-dollar basis; the latter provision may be waived by the commission if it imposes financial hardship on an LEA.

10) Authorizes funding to be used to support teacher career pathways, signing bonuses, service awards, student debt payment, living stipends, or other solutions that address a local need for STEM teachers.

11) Prohibits grant recipients from using more than 5 percent of an award for administrative costs.

12) Requires the CTC to:

    a) Require grant recipients to demonstrate a local need for STEM teachers.

    b) Give priority to applicants that include an arts education component in their STEM programs.

    c) Determine the number of grants awarded, and the total amount awarded to each applicant.

    d) Require recipients to submit annual status and progress reports, as well as a final implementation report within three years of receiving an award.

    e) Allocate 90 percent of funding to each grant recipient at the time of the initial grant award, and allocate the final 10 percent upon receipt of the final implementation report.

STEM Education for Rural Schools Grants Program

13) Appropriates for the 2018-19 fiscal year $20 million to CDE to establish the STEM Education for Rural Schools Grants Program, to provide one-time competitive grants to rural LEAs—including school districts, COEs, and charter schools—for the purpose of providing professional learning opportunities to teachers, principals, technical support staff, and other school leaders to develop high quality, standards-based STEM teaching and learning opportunities for students.

14) Requires grants to be used to:

    a) Increase the capacity of specified personnel to support standards-based STEM teaching and learning.

    b) Develop and support networks and mentoring opportunities between LEAs.

    c) Provide high quality, evidence-based professional development to specified personnel, to improve standards-based STEM pedagogical content, knowledge, strategies, and leadership.

    d) Support regional teams in the development and implementation of high quality STEM teaching and learning environments.

15) Prohibits grant recipients from using more than 5 percent of their awards for administrative costs.

16) Requires CDE to:

    a) Define “rural” for the purposes of the grant program.

    b) Determine the number of grants awarded and the total amount awarded to each recipient.

    c) Give priority to applicants that demonstrate alignment to state science, math, and visual and performing arts standards in their STEM education programs.

    d) Require recipients to submit a final outcome report to the department within three years of receiving a grant award.

Computer Science Education for Schools Grants Program

17) Appropriates $30 million to the CDE to establish the Computer Science Education for Schools Grants Program, to provide one-time competitive grants to LEAs—including COEs, school districts, charter schools, or a consortia of LEAs—for the purpose of integrating rigorous computer science education into their K-12 academic program.

18) Requires grants to be used to:

    a) Develop and implement a plan that specifies what computer science education is and how the curriculum will be made accessible to all students.

b) Provide ongoing professional learning opportunities—through teacher stipends, travel reimbursements, coaching, or other means—to increase the capacity of teachers to provide instruction in computer science.

c) Provide opportunities for pupils to be introduced to computer science in elementary school.

d) Provide equity-minded computer science courses that are standards-based or prepare students for college and career readiness, in grades 9-12.

e) Ensure all high schools offer rigorous computer science education.

f) Promote equity and access to computer science education.

g) Expand community support for computer science education by developing partnerships with local organizations, business and industry, nonprofits, and institutions of higher education.

h) Identify public or private partners that will provide technical support.

19) Requires CDE to give priority to applicants that include an arts educational component in their computer science education.

20) Encourages grant recipients to partner with institutions of higher education and professional or nonprofit organizations for the purpose of building a sustainable K-16 pipeline.

21) Authorizes use of funds to provide LEAs with broadband connectivity and infrastructure and access to hardware and software.

22) Requires the grant to support, and not supplant the efforts of the computer science strategic implementation advisory panel.

Surveying STEM Instructional Time and Studying the Feasibility of a Pre-Grade 5 Science Assessment

23) Appropriates $2 million to evaluate the feasibility of assessing pupils in science prior to grade 5, and to survey a representative sample of LEAs to determine how much instructional time pupils receive in math and science during the school year.

24) Requires the feasibility study to review:

a) The impact of increased instructional time in science on future academic performance.

b) Performance tasks for individual students and the utility of those tasks for measuring school and district-level performance in science.

c) Adaptive assessments in science.

25) Requires the survey to include information about the qualifications of the teacher and a description of the math and science instruction provided to students.

26) Requires the CDE to complete the study and survey on or before January 1, 2020 and to submit the report to the Legislature and Director of the Department of Finance.

EXISTING LAW:

1) Requires the Instructional Quality Commission (IQC) to consider developing and recommending computer science content standards to the SBE on or before July 31, 2019 (EC 60605.4).

2) Required the State Board of Education (SBE) to adopt science content standards that would replace the previous science standards on or before November 30, 2013 (EC 60605.85).

3) Authorizes the CTC to issue intern credentials as an alternate route to earning a teaching credential. This credential is valid for a period of two years and authorizes the holder to teach in a self-contained classroom while completing their teacher preparation course work. Approved intern programs are sponsored by colleges, universities, school districts, or county offices of education. To qualify, an individual must possess a bachelor's degree, satisfy the basic skills requirements, meet subject matter competence, and obtain character and identification clearance. University intern programs are cooperative teaching, counseling, school psychology, and administrative programs between a university and an employing school district that are administered by the university. District intern programs are for teachers only and are administered by employing school districts whose programs may or may not involve university course work. Completion of an intern program results in the issuance of a preliminary or clear credential (EC 44325, et seq.).

FISCAL EFFECT: The Office of Legislative Counsel has keyed this bill as a state mandated local program.

COMMENTS:

Need for the bill. The author's office states: "The issues of access, equity, and student achievement in STEM education are statewide concerns that require statewide leadership. As a state, California must make STEM education a priority and invest accordingly. Under current law, public schools in California do not have the resources, staffing, or support to provide our students with the courses critical to receiving a quality STEM education and preparing for succeeding in STEM careers."

Limited access to STEM education in grades K-12. A 2016 review of STEM education studies conducted by the U.S. Department of Education's Institute of Education Sciences shows that access to advanced math and science courses in high school is a strong predictor for success in post-secondary STEM courses. This finding holds true for both male and female students, and across all ethnicities examined. However, certain populations, including Hispanic and African American students, take fewer high-level high school math and science courses, even though their interest levels in STEM subjects match those of their white peers.

A 2017 report by Ed Trust West shows that many of California's high school students do not have access to advanced STEM coursework, and that inequities in access are particularly problematic for certain populations of students, including English Learners (EL). The authors state, "In California, only 58 percent of high schools…offer chemistry, 51 percent offer physics, and 7 percent offer math courses title advanced. Only 11 percent of ELs attend schools that offer

the "advanced" math courses, and ELs are less likely than their non-EL peers to be enrolled in these courses when available." Ed Trust West further states that giving EL students access to high quality STEM coursework is beneficial, not only for advancing their STEM knowledge, but for advancing development of their language skills.

Limited access to STEM education is of concern not only at the high school level, but in elementary grades as well. In 2011, WestEd, the Lawrence Hall of Science at UC Berkeley, and SRI International issued a report on elementary STEM education in California. Among their key findings: 40 percent of K-5 teachers report that their students receive 60 minutes or less of science instruction per week, less than 15 percent have received any science-related professional development in the previous three years, and only a third of elementary school teachers feel very prepared to teach science. In addition, the authors found that racial inequities in STEM knowledge are already apparent in elementary school: in 2009, the state's fourth graders performed at the lowest level nationally on the National Assessment of Educational Progress (NAEP) science test, and fewer than 10 percent of African American and Hispanic fourth graders scored proficient, compared to 41 and 45 percent of their white and Asian peers, respectively. Altogether, these findings led the authors to conclude that "children rarely encounter high-quality science learning opportunities in California elementary schools because the conditions that would support them are rarely in place."

The above reports raise the question of whether today's K-12 students are being adequately and equitably prepared to take full advantage of emerging opportunities in STEM professions. In 2012, the President's Council of Advisors on Science and Technology stated that the United States will need 1 million more STEM professionals than the country will produce at the current rate over the next decade, if the country is to maintain its status as a global leader in science and technology.

California's STEM teacher shortage. Multiple reports highlight California's ongoing teacher shortages, which are especially chronic and severe in certain subject areas, including bilingual education, special education, and STEM subjects. In a 2016 report (entitled *Addressing California's Emerging Teacher Shortage: An Analysis of Sources and Solutions*), the Learning Policy Institute (LPI) summarizes the problem: "After many years of teacher layoffs in California, school districts around the state are hiring again. With the influx of new K-12 funding, districts are looking to lower student-teacher ratios and reinstate classes and programs that were reduced or eliminated during the Great Recession. However, mounting evidence indicates that teacher supply has not kept pace with the increased demand." LPI also reports the following findings:

1) Enrollment in educator preparation programs has dropped by more than 70 percent over the last decade.

2) In 2014-15, provisional and short-term permits—intended to help districts hire teachers on an emergency basis, when fully-prepared, credentialed candidates are unavailable—nearly tripled relative to the number issued two years previous, growing from about 850 to more than 2,400.

3) The number of teachers hired on substandard permits and credentials nearly doubled in the last two years, to more than 7,700, comprising a third of all the new credentials issued in 2014-15.

4) Estimated teacher hires for the 2015-16 school year increased by 25 percent from the previous year, while enrollment in teacher education programs at the University of California (UC) and California State University increased by only about 3.8 percent.

5) The pipeline of prepared STEM teachers is shrinking. From 2012-16, the proportion of math and science teachers entering the field on substandard credentials or permits doubled, from 20 to 40 percent, while the number of STEM teachers entering with full credentials dropped from 3,200 to 2,200.

Local Solutions Grants. This bill addresses the STEM teacher shortage by mirroring the local solutions grant proposed in the Governor's budget this year. The bill appropriates $50 million for local education agencies (LEAs) to recruit, develop, and retain STEM teachers using the following methods, including, but not limited to, teacher career pathways, signing bonuses, service awards, student debt payment, living stipends, or other transformational solutions that address a local need for STEM teachers. This proposal focuses on both recruitment and retention in the same grant program. While LEAs can easily operate programs to provide signing bonuses and stipends to teachers, it is unclear whether an LEA could operate a service award (teacher scholarship) or student debt payment program. Typically, teacher scholarship grant programs in other states operate through a single statewide grant agency, and teacher candidates across the state apply through that agency. Once they receive a scholarship and complete their preparation, the teacher can work anywhere in the state to fulfill their service commitment. ***The Committee may wish to consider*** whether it is appropriate for a school district to select a first-year teacher preparation candidate, award them a scholarship, commit to hire them in two years when they complete their preparation, and then have the teacher commit to work for that district for four years. ***The Committee may wish to consider*** whether it's more appropriate to have a single statewide agency administer the teacher scholarship grant program, so that teachers can then work anywhere in the state.

According to the Learning Policy Institute, "The more debt college students incur, the less likely they are to choose to work in a lower-wage profession. A recent study of students at a highly selective undergraduate institution found that incurring debt increased the odds that students chose "substantially higher-salary jobs" and "reduce[d] the probability that students [chose] low-paid 'public interest' jobs." The influence of debt on job choice was "most notable on the propensity to work in the education industry." In other words, the top-performing students were more likely to pursue a career in education when they did not have a large debt. Other research has found that minority students and students from low-income households perceive student loans as a greater burden than other students with similar student debt earning similar salaries. This research suggests that loan forgiveness and service scholarships may be especially effective for recruiting teacher candidates from low-income and minority backgrounds."

Roll-out of new science standards in 2018. In 2013, the SBE adopted the Next Generation Science Standards (NGSS) as California's content standards in science, with some modifications of the national model. In contrast to California's previous science standards, NGSS shifts focus from having students memorize scientific information to teaching students how to think critically about core scientific ideas, how to connect key concepts across disciplines, and how to implement processes used by practicing scientists. In 2017, CDE, the California Science Teachers Association (CSTA), COEs, and several other organizations began offering multiple two-day symposia to help teachers and administrators understand the new standards and develop

plans for implementation in their schools. Although SBE will not finalize adoption of NGSS-aligned instructional materials until November 2018, CSTA reports that some school districts are already implementing NGSS using materials that they have developed themselves.

According to CSTA, the focus of NGSS on hands-on, discovery-based learning through experimentation necessitates access to a wide variety of instructional materials, including materials that will allow students to learn about natural phenomena by constructing models, as well as computer software to support data analysis and computational thinking. Teacher interviews conducted by EdSource highlight the challenges of implementing NGSS due to the cost of instructional materials. In the article, a science education professor from San Jose State University states, "You don't need a $3,000 piece of fancy equipment to teach Next Generation Science Standards, but you do need the basics. You need a working Wi-Fi connection. You need beakers. You need measuring equipment. You want your students to participate in real science, like real scientists do, and that costs money." Because this bill is designed to address multiple funding challenges within STEM education, ***the Committee may wish to consider*** whether this bill should also include a grant program to help school districts purchase NGSS-aligned instructional materials that will be adopted by the SBE in November 2018.

NGSS-aligned assessments are undergoing field tests. This bill appropriates funds to study the feasibility of assessing students in science before grade 5. According to CDE, the new California Science Test (CAST) will undergo field testing between April and July 2018 and become fully operational between January and July 2019. The CAST "measures what students know and can do using the California NGSS" and will be given in grades 5 and 8, and once during high school. ***The Committee may wish to consider*** whether it would be prudent to postpone consideration of a pre-5th grade assessment, given that the state is still in the process of testing its 5th grade, 8th grade, and high school NGSS-aligned assessments.

New computer science standards are being developed. In 2014, Governor Brown signed AB 1539 into law, which required the IQC to consider developing and recommending computer science content standards for grades K-12 to the SBE. Between July 2017 and January 2018, a Standards Advisory Committee was appointed and developed guidance for the new standards. A public review period for the first draft of the computer science standards is scheduled to occur between April and June 2018, and SBE is expected to take action on IQC's recommended computer science standards in September 2018.

Recommended amendments. Staff recommends the following amendments:

1) Remove the requirement for a study that would determine the feasibility of a science assessment before grade 5.

2) Remove the requirement for a survey that would examine instructional time in math and science. Information that is currently available, some of which is summarized in this analysis, already demonstrates key issues in STEM education in California, including inadequate and inequitable access to STEM instruction across grade levels, geographic regions, and ethnic groups.

3) Add a $50 million grant program that would assist school districts with purchasing state-adopted, NGSS-aligned instructional materials.

4) Separate the local solutions grant into two grant programs. One grant program of $25 million focused on retention of STEM teachers using teacher career pathways, signing bonuses, living stipends, or other transformational solutions. And one grant program of $25 million, administered by a single county office of education, focused on recruitment of new STEM teachers using teacher scholarships.

Related legislation. AB 2609 (O'Donnell) of this Session, which is pending before this Committee, establishes a competitive grant program, to be administered by CDE, for the purposes of recruiting, training, supporting, and retaining STEM scientists with doctoral and master's degrees as K-12 STEM teachers.

AB 2547 (McCarty) of this Session establishes the California Teacher Corps program, subject to funding in the budget, to provide matching grants to local school districts to create or expand teacher residency programs in which the funds can be used to pay for master teacher stipends, stipends for residents, tuition assistance, and the costs of mentoring and induction.

AB 169 (O'Donnell) of this Session establishes the Golden State Teacher Grant Program to provide one-time grant funds of twenty thousand dollars ($20,000) to each student enrolled on or after January 1, 2018, in a professional preparation program leading to a preliminary teaching credential, if the student commits to working in a high-need field for four years after he or she receives a teaching credential. The bill targets teacher shortages in the following areas: bilingual education, mathematics, science, STEM, and special education.

Prior legislation. SB 436 (Allen) would have established the California STEM Professional Teaching Pathway to recruit, train, support, and retain qualified science, technology, engineering and mathematics (STEM) professionals, including military veterans, as mathematics and science teachers in California. The bill also included an unspecified and ongoing appropriation, beginning in 2017-18, for allocation to the California Center on Teaching Careers (Cal-Teach) to support the purposes of the bill. This bill was held by the author prior to hearing by this Committee.

AB 1539 (Hagman), Chapter 876, Statutes of 2014 required the IQC to consider developing and recommending computer science content standards for grades K-12 to the SBE, on or before July 31, 2019.

REGISTERED SUPPORT / OPPOSITION:

Support

The California STEM Network (sponsor)
American Association of University Women of California
California Educational Technology Professionals Association
California Science Teachers Association
Code.org
Common Sense Kids Action
Level Playing Field Institute
Kapoor Center for Social Impact
Make Knowledge
Microsoft
Project Lead the Way

San Francisco Unified School District
San Joaquin County Office of Education
Silicon Valley Leadership Group
The Tech Museum of Innovation

Opposition

None on file.

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