

Washington STEM Initiative

Concept Paper
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Imagine...

Thanks to a partnership with Clark College and Washington State University-Vancouver (WSU-V) to strengthen professional development, student performance in three schools in the Vancouver School District had steadily improved. But many students did not feel that their academics were relevant to their futures, and many students and families still didn't believe that success in STEM careers was within their grasp. In response, the Learning Coalition brought together the local MESA chapter, several leading engineering firms, and the Workforce Development Council.

Two years into their work, improvements are evident. The school schedule now allows all middle and high school students to spend one month at an engineering firm to complete a real-world design challenge. Practicum experiences for WSU-Vancouver preservice teachers also are being held in those company classrooms. MESA is providing company tours for families of students from under-represented groups to showcase local job opportunities. College faculty and admissions staff are visiting these families to discuss two- and four-year degree paths and scholarship options, while undergraduates are serving as STEM mentors to the K-12 students. As a result, 80 percent of students in the first cohort with STEM mentors have enrolled at Clark or WSU-V to become teachers or engineers.

In addition, teachers, students, parents, and administrators from neighboring schools are visiting the three Studio Sites in the Learning Coalition. Classroom observations and lesson studies are fostering discussions about instructional and collaborative practices that support student learning. In just two years, more than 250 teachers serving 16,500 students have engaged in learning experiences in the coalition. Evaluations detail significant improvements in classroom practice, and two more schools are interested in becoming Studio Sites. And results of time and resource audits are informing the STEM Center's policy agenda on using non-instructional time to support instructional effectiveness.

Meanwhile, elsewhere in the state yet another innovation has emerged. Students from Cape Flattery to Colville are expanding their horizons through the First Nations Opportunity Coalition. This coalition reached beyond geographic boundaries and invested heavily in a high-tech network to link schools serving Native American students together with STEM professionals of Native American ancestry all across the country. Through regular webinars and Internet discussions, these students are exploring how the values and beliefs from their ancestry intersect with contemporary ideas in ocean sciences, fisheries biology, and marine engineering. The results have been shared with tribal leaders as well as local, state, and national policy agencies. After only two years, dropout rates in the middle and high schools have decreased 40 percent, and enrollment in "elective" math and science courses increased 68 percent. Teams of teachers, students, parents, and administrators from neighboring districts visit the Studio Sites regularly to learn how to more effectively use technology and see how cultural sensitivity and proficiency can motivate and inspire students to achieve at high levels.

Thanks to efforts such as these spurred by the Washington STEM Initiative, the state's education policy is smarter, resources are being allocated to ensure maximum effectiveness, teachers have tools to support more relevant, research-based instruction, a culture of continuous improvement is taking hold in more schools, and successes are closely documented and widely shared.

The bottom line: Washington graduates more students at the high school and college levels with the science, technology, engineering, and mathematics know-how to succeed in careers, in communities, and as well-informed citizens.

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The Need

To succeed in the 21st-century knowledge economy, Washington students need the ability to create, design, innovate, and think critically to solve complex challenges. They need deep knowledge and strong skills in math, science, technology and engineering — and be excited and ready to use that knowledge in the real world.

Washington is not currently prepared to offer students the opportunities they deserve. For example, the state ranks fourth in the country in technology-based corporations, but 46th in participation in science and engineering graduate programs. Low-income and minority students are least represented in STEM fields; less than 5 percent of the STEM postsecondary degrees awarded in Washington are earned by students of color. The state falls short not just in producing graduates with high-level degrees; too few citizens have the skills to fill the jobs that require less than a degree from a four-year university or graduate school.

The challenges begin at the K–12 level. Since Washington adopted standards-based reforms and accountability in the mid-1990s, the significant gains in reading and writing have not been matched by similar improvements in math and science achievement. For example, only 44 percent of Washington's 4th graders and 36 percent of 8th graders scored proficient or above in math on the most recent National Assessment of Educational Progress, and only 29 and 33 percent, respectively, scored that well in science. Average scores were much lower for low-income, African American, Hispanic, and Native American students.

Students struggle, in part, because the state has too few adequately prepared math and science teachers. According to a recent study by the State Board of Education, nearly 500 new math teachers will need to be hired by 2013 in order to offer a third year of math — part of the new graduation requirements (known as “Core 24”) recommended by the State Board of Education. A 2008 report from the Professional Educator Standards Board projected the state would need about 1 percent more math and science teachers a year until 2017, with a 15 increase in high school math teachers because of the new graduation requirements.

Washington State has numerous initiatives to strengthen STEM education. Some focus on policy, others on programs. Some have been successful in improving teacher effectiveness and student performance. Many have not. Still others never have been meaningfully evaluated. Lessons learned from classrooms and districts too rarely have been connected to changes in policy. While the state benefits from some promising STEM education programs, these efforts are not fully scaled or integrated into an overall STEM framework.

Partly as a result of these shortfalls, Washington currently is graduating only enough students with the credentials to fill 67 percent of the expected annual job openings from 2009 to 2014 in engineering, 56 percent in computer science, and 65 percent in the medical professions.

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Our economy and our future depend on the degree to which we can make the leap from incremental improvement in math and science achievement to *transformational change*. We need fundamentally different results — and achieving them will require that we work in fundamentally different ways.

- We need *all* students — not just the top 5 or 10 percent — to graduate from high school with the math and science skills needed to succeed in college or to compete for family-wage jobs in the 21st century.
- We need high levels of course and degree completion — not high levels of remediation and drop-out.
- We need math and science teachers with demonstrated effectiveness in every classroom — not a “widget” assigned to a classroom because of convenience, seniority, or personal preference.

We need to bring the rigor of scientific inquiry into our education systems no less than in medicine or engineering. We need to learn from what we do and adapt and evolve from what we learn.

We need to engage and ignite the imaginations of young people, educators, and the public to achieve dramatic improvements in STEM teaching and learning.

The Solution

The Washington Science, Technology, Engineering and Math (STEM) Initiative will catalyze improvements in the state’s K–12 education system, transform the teaching profession, and dramatically increase the number of Washington high school students who graduate ready to enter and succeed in STEM postsecondary degree programs and careers. The Initiative is intended to benefit every K–12 student in the state, with a particular emphasis on low-income, minority, and other under-represented students.

Through a statewide STEM Center, the Initiative will support and coordinate state, regional, and local STEM teaching programs, practices, and policies. The STEM Center will provide leadership in multiple areas that will help accelerate improvements in STEM instruction throughout the state:

Investor: Identify, evaluate and **leverage existing resources** so that they have a greater impact; secure and target resources to disseminate effective models to **benefit and serve all students**, as well as to generate knowledge where innovation is needed to drive transformative change.

Partnership-builder: Create and support an expanding **statewide STEM network** of practitioners, policymakers, and researchers with a shared vision and commitment to dramatically improve STEM instruction.

Coordinator: Ensure that the work of the Initiative is focused on strategic priorities that align with evidence of **best practice generated at the state and national level**.

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Evaluator: Assess the quality and impact of various programs, policies, and interventions to support a **learning network that uses evidence** to guide its actions and communications.

Communicator: Create and use a state-of-the-art information network to proactively **facilitate knowledge sharing** among schools, districts, colleges, universities, and policy agencies, and to serve as a conduit to disseminate best practices from the national arena.

Champion: Advocate for **improved policies and practices** at the state and national level, especially those that will improve the achievement of groups historically underrepresented in STEM.

The catalysts for this effort are the Washington Roundtable, a nonprofit, 501(c)6 public policy organization comprised of chief executives representing major private sector employers throughout Washington state, and the Partnership for Learning (PFL), an independent 501(c)3 organization founded in 1994 to build public awareness, involvement, and support for vital education improvements.

Guiding Principles

As the Washington STEM Initiative enters the statewide community of STEM agencies, institutions, and programs, it is important to define not only the scope of work that the Initiative will pursue, but also the principles that will govern how that work is done. These six guiding principles articulate the values central to the Initiative as a dynamic learning organization responsive to its partners and committed to achieving its outcomes.

Focused on Strengthening Instruction. The focus of all improvements in practice and policy will be instructional effectiveness. Research demonstrates that the interactions between teachers and students around important content are the major determinant of student success - more than funding, home environment, the quality of curriculum materials, or many other variables. To that end, the Initiative will identify where great instruction is occurring and develop systematic strategies to ensure that many more teachers, administrators, and higher education faculty can see for themselves what effective teaching looks like and can create the conditions for such teaching all across state at both the K12 and undergraduate level.

Scalable and Equitable. High-quality programs will be identified and designed with the expectation that they can and will be scaled statewide to benefit all students. "Spotlight" schools or even districts may provide proof-of-concept models but are unlikely to produce the number of well-educated STEM graduates the state needs. Therefore, the Initiative will go beyond creating just a few pockets of excellence and generate significant change to positively impact the state's public education system.

While the Initiative will ensure effective programs are scaled to ultimately serve all students, the significant and immediate needs of students or communities who traditionally have been underserved and shortchanged can not be overlooked or put off to the future. Washington

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needs to dramatically accelerate the achievement of low-income and minority students and strengthen the capacity of schools, districts, and institutions of higher education to provide the quality instruction and to foster a culture that embraces a shared responsibility for student success. Grants, programs, and policies championed by the Initiative will be framed accordingly.

Collaborative. The Initiative will engage K–12 districts and schools, institutions of higher education, business and industry, and policymakers in ways that capitalize on their unique resources and expertise in support of a shared vision of effective STEM teaching and learning. The partnerships will maximize the potential impact of existing assets and develop new solutions where needed. Indeed, the development of this Initiative already has involved extensive input from hundreds of stakeholders from across the state who have played a critical role in shaping the proposed strategies and outcomes.

Outcomes-Driven and Research-Based. Objectives will be defined by high-level goals that are aligned to the state’s education and economic development priorities. Strategies that relate to each objective will define each program, whose effectiveness, in turn, will be measured by comprehensive performance indicators. All stakeholders in the Initiative will regularly collect data, evaluate their programs, and commit to using the information to drive continuous improvements. It is essential to use evidence of effectiveness as a criterion for allocating resources and scaling up programs as well as take into account the local environments that made success possible. By collaboratively defining clear and measurable goals at the front end and then rigorously evaluating results at every level, the Initiative will put a premium on effectiveness and help break down the walls between research and practice and between practice and policy. By “connecting the dots” among practice, policy, and research, the Initiative will help ensure that all stakeholders are moving together to implement an aligned agenda of stronger STEM instruction.

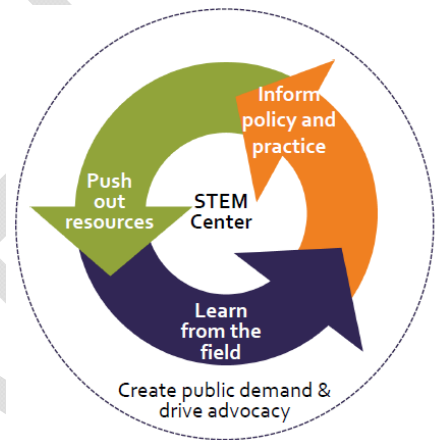
Innovative. To drive lasting and transformative improvements in STEM teaching and learning, the Initiative will seek innovative solutions on issues such as teacher evaluation, teacher tenure and promotion policies, compensation, and alternative preparation routes. The Initiative will develop effective strategies to expand and scale “proven” innovations. With adequate investment, Washington could greatly expand the number of children served by school reform models with demonstrated effectiveness. The Initiative will also invest in creating a networked innovation infrastructure that 1) provides relevant data and information in a timely way to teachers, administrators, and policymakers; and 2) allows effective evaluations of the impact of various interventions. In addition, the Initiative will include in its portfolio of investments carefully selected high-risk/high-gain, early-stage innovations that will break new ground in understanding instructional effectiveness. By bringing a statewide approach to innovation, the Initiative will be in an excellent position to identify and retain effective partners and make the requisite investments to greatly expand the number of students served by K12 and higher education reform models with demonstrable effectiveness.

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Coherent, Coordinated, and Comprehensive. Perhaps most important, the Initiative will bring a comprehensive, coordinated approach to reform. The policy agenda will both drive and be informed by lessons from the field. Intermediate and transformative goals will be clear and aligned. Effective local and statewide communications support will reinforce both the policy work and classroom practice — shedding light on quality instruction for teachers and school leaders and prompting policymakers to act. By assembling and managing a statewide group of education, business, civic, and policy partners, the Initiative will ensure that program and policy changes are coordinated, coherent, and focused. The Initiative’s STEM Center will become a statewide focal point for leadership in STEM teaching and learning.

PART II. PROGRAM DESIGN

The Washington STEM Initiative will accelerate improvements in math and science achievement across the state, especially for low-income and other under-represented students. With leadership from the statewide STEM Center, four key strategies will create a dynamic network able to effectively implement programs and practices in the field, supported by a robust policy agenda and communications strategy to drive significant and lasting changes in the education system.

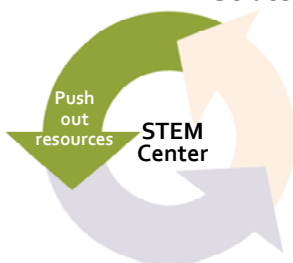


Strategy 1: Push Out Resources

Identify, develop, disseminate, and scale quality programs, practices, and policies

The STEM Center will support and coordinate state, regional, and local STEM teaching programs, practices, and policies. By establishing the STEM Center as a quality control clearinghouse of effective innovations, the Initiative will help create and sustain a culture of evidence in schools, higher education, and businesses. By identifying and sharing proven existing practices identified at the state or national level, the Center will be able to effectively disseminate what is known about effective instruction. By

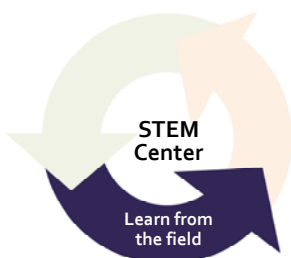
focusing on innovative partnerships in a supported network, the Center will ensure that effective innovations are shared, further strengthened and disseminated again.



Strategy 2: Learn from the field

Support and monitor implementation that maintains quality and sustainability

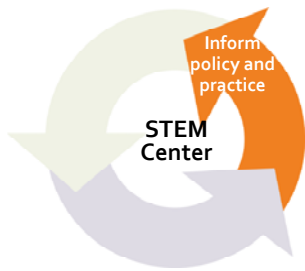
The key to sustainable changes that will strengthen instruction and improve student achievement in the STEM fields is to improve practices for recruiting, preparing, hiring, retaining, supporting, and evaluating higher-quality K–12 teachers. While research studies and existing programs have generated a wealth of knowledge effective teaching and learning, this knowledge has yet to be put to practice at a scale sufficient to have a



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significant impact statewide. The Initiative will help bridge the chasm between research and practice; between what we know and what we do. By scaling up the dissemination of best practices while also creating structured opportunities for educators to observe and learn from schools, districts, institutions of higher education, and STEM businesses and industries, the Initiative will expand the capacity of more STEM educators to teach more students well.

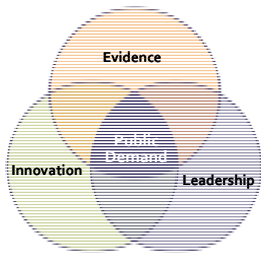
Strategy 3: Inform policy and practice



Use evidence to support policies that will trigger lasting system improvements

The STEM Center will actively engage in state, and national initiatives to gather information on successful interventions and use the information to promote public policies and evidence-based practices that advance teacher effectiveness in the STEM fields. The policy and programmatic agendas of the STEM Center will be tightly linked to ensure practice-based evidence gathered from partners within the state is generated to inform discussions. By ensuring that policymakers learn from what is working in the field, the Initiative will help ensure that new policies and public investments will have the greatest impact on the most students.

Strategy 4: Create public demand for quality



Raise awareness and engender support

The STEM Center will develop and implement a coordinated statewide communications plan that will build public understanding and demand for higher-quality STEM education for all students. Communities will have access to relevant, reliable, and timely information to help students and families understand and take advantage of STEM education and career options. They will understand the benefits of high-quality STEM education, not just to individual students but to their communities and the state. They will have a clear view of what is possible when high-quality STEM educational opportunities are offered. And they will expect policymakers to ensure that all students, regardless of demography, have access to the effective teachers.

Commitment to Quality

Monitoring outcomes and impact

In accordance with the guiding principles of the Initiative, the STEM Center will implement a comprehensive evaluation plan to ensure all strategies are monitored for effectiveness, and that increases in student success in K12 and postsecondary education and the workforce remain the ultimate measure of effectiveness. The STEM Center will assure that what is valued is assessed and that results of those assessments drive adjustments to stay on course for long-term success. The STEM Center will break new ground in identifying, collecting, and sharing data on meaningful measures of student success that go beyond high-stakes state-level test scores and course enrollment. While any one indicator is insufficient, and some more difficult to measure, the Initiative will construct a robust strategy that recognizes the complexities of the student learning experience. Appendix A offers a table of potential indicators under consideration.

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An early priority of the STEM Center will be to define short-term measures that will provide an indication of progress toward the desired long-term impact. The STEM Center will collaborate with a nationally recognized evaluation firm to establish linkages between the proposed strategies and the desired outcomes to form the foundation the evaluation plan.

PART III. FROM DESIGN TO IMPLEMENTATION

To support the four strategies just described, the STEM will drive the formation of a statewide network of K-12 districts and schools, institutions of higher education, and businesses and communities with a common goal: dramatically scale up the development and dissemination of best practices in STEM instruction to benefit all students. To achieve this goal, the Center will focus the network on four priorities:

- **Significantly improve the quality of instruction** in STEM disciplines provided to all students to ensure success in post-secondary education or workforce, without need for remediation;
- Forge strong connections between business, industry, higher education, schools, and communities to provide students opportunities to learn from STEM professionals in classroom settings and in the workplace that **incorporate real-world STEM methods, tools, and technologies**;
- Establish a culture that ensures all partners take **personal responsibility for ensuring the success of each student**
- Create pathways that **maximize opportunities for students from underrepresented minority groups to succeed** in STEM education and careers, including STEM teaching.

All network participants will adopt and advance a culture of continuous learning, use data to measure progress, and openly share evidence with peers throughout the state. The STEM Center's communication and policy work will amplify the voices of the individual members of the network and create a common message that will be used to drive system changes needed to scale and sustain improvements statewide.

Strategy One Work Strand: Push Out Resources

1. **Dynamic and Interactive Internet Portal.** The Center will use state-of-the art technology to provide access to information on evidence-based practices, programs, and policies to support STEM teaching and learning to all schools, districts, institutions of higher education, businesses and communities. A dedicated Chief Information Officer will create and support a data-base driven website that catalogues, organizes, and stores information on leading resources related to improving instructional effectiveness in the STEM disciplines. The site will be dynamic, based on user-input, and will create customized views and information based on interest. This internet portal will be freely accessible and support user comments,

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questions, discussion, and reviews. The site will also include detailed descriptions and profiles of the partners funded through the Center and support and provide a wide range of communication tools – webinars, videoconferences, discussion forums, synchronous and asynchronous consultancy dialogues - to foster communication among grantees.

2. **Technical Assistance Network.** The Center will help focus and leverage existing funding streams, as well as access and generate new revenue sources, to help scale and disseminate critical programs and resources needed to drive significant improvements in STEM teaching and learning. Across the state and the nation there are models that have been shown to have a positive impact on instruction and student outcomes. The STEM Center will conduct a survey to help identify effective local and national technical assistance programs and document what has made them successful, accounting for local contexts and examining what has prevented these successes from being scaled. The Center will foster the formation of a Technical Assistance Network to build the capacity of these programs and, where appropriate, expand the range of these programs to fill gaps for needed services.

Technical Assistance Partners, typically based at universities, nonprofit, or for-profit organizations, will provide products, programs and services that will support schools, districts, colleges, universities or businesses throughout the state in their shared efforts to improve instructional effectiveness in STEM. While TA Partners may focus on long-term and more systemic issues such as coupled teacher evaluation and professional development practices, others may focus on more ad hoc, shorter-term issues, such as preparing business and industry partners to offer high-quality student or teacher STEM learning experiences in workforce settings.

The Center will convene the Technical Assistance Partners quarterly, not just to report on their work, but to build deeper understanding of their specific programs and approaches and to identify effective means to adapt, evolve, and connect their work to accelerate learning gains for students across the state. In this way, the Technical Assistance Partners will develop into a collaborative network with a broad-based, comprehensive approach for providing technical assistance to support all schools.

The STEM Center will use two mechanisms to award resources to Technical Assistance Partners. Existing programs that have a strong track record of effectiveness and that are focused on key priority strategies and outcomes consistent with the vision of the STEM Center will be awarded resources through contracts and memorandum of understanding to help scale their programs. Where new resources, programs or services are needed, and no program currently exists to fill that need, the STEM Center will use a competitive RFP process to select grantees for the design and development work required. By helping to coordinate and focus existing resources, as well as generate new public and private funds, the Center will be able to both “expand the pie” and ensure that funds are spent on high-impact

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work, as well as target high-priority areas for new investments to spur innovation.

3. **STEM Learning Coalitions.** The STEM Center will invest in high-capacity partnerships among businesses, higher education, and K–12 school systems ready to develop model programs, practices, and policies to address current challenges related to preparing, recruiting, hiring, certifying, supporting, evaluating, and retaining high-quality STEM teachers to improve student success. The focus of the Coalitions will be tightly coupled with the policy agenda of the STEM Center. Coalitions will be expected to demonstrate high level institutional commitment as evidenced by agreement to full participation from key leaders, to discontinue participation in other initiatives that lack evidence of impact, to collect and submit data to monitor and measure progress, and to make institutional policy changes based on findings. The STEM Center will support a review and feedback system to ensure Coalitions learn from their individual and collective successes and failures and adjust their actions and strategies accordingly. Ultimately, the findings generated by Coalitions will serve as critical proof-points that will provide evidence to advocate for needed changes in state-level programs or policies.

Generating New Knowledge. Leadership for launching and supporting a Learning Coalitions will come from organizations and institutions with a track record of effectiveness in a range of areas that correlate with positive student outcomes, such as administrative leadership, teacher content knowledge, and student growth on local or state assessments. Learning Coalitions will utilize the combined resources, knowledge, and skills available through their diverse institutions to develop innovative ideas for promising programs and to measure their efficacy and impact on instructional effectiveness. Their work will focus on authentic, large scale problems of practice that limit instructional effectiveness to help translate theoretical research findings into scalable operational models that work for teachers and students.

Coalitions will be expected to demonstrate what is required for their innovation to be successful in their own setting, but also to identify what adaptations can be tolerated to allow those practices to be translated to other settings and still achieve similar results. Therefore, Coalitions will need to reach out to other schools and districts — both “early adopters”, as well as those that who are more reluctant or less capable of participating – to support and monitor implementation. In addition, Coalitions will be required to give special attention to high-need classrooms, schools, and districts serving low-income and minority groups. Coalitions will help create the conditions for success in these settings, including building a culture that minimizes administrative and teacher turnover and works closely with families and community leaders to build ownership in the school. The intentional design, implementation, and dissemination strategy will ensure that effective models spread swiftly and effectively.

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Fostering Collaborative Learning. As these model programs mature Coalitions will be asked to support “Studio Sites” in schools, districts, colleges and universities, or businesses to make their work accessible and viewable to others. Studio Sites will provide a clear image of the model as it is implemented in real time with real students to demonstrate what is possible and how to get there. These Studio Sites will promote practice-based, peer-to-peer learning to support dissemination of the model to new sites and continuous improvement in its original setting.

The STEM Center will describe the model programs and Studio Sites through its website. Field-based Program Managers distributed across the state will engage teams of educators, business, and community leaders — perhaps supplemented by parents and students — in learning experiences to identify an appropriate Studio Site for observation, based on their own needs and improvement goals (See Strategy 2 Work Strand).

Learning Coalitions will be funded through a competitive RFP process that aligns with the Center’s policy priorities. While awards will be multiyear in nature, they will be reviewed annually through site visits, reports, and data analysis. Renewal will be contingent upon demonstrating measurable progress toward the stated goals. STEM Center Program Directors will actively monitor activities in the Coalitions through regular site visits, ongoing data collection, and annual reporting to maintain standards of quality.

As the STEM network grows, the Center will provide opportunities for collaboration and communication among Coalitions, Technical Assistance Partners, and the STEM Center to ensure coherence and widespread learning from their shared implementation efforts. As more model programs develop – and as more schools successfully implement them - new “Studio Sites” will be supported to expand the network and make observation experiences even more accessible to support ongoing learning and improvement.

4. Opportunity Coalitions: These specialized coalitions represent the Center’s unwavering commitment to address the needs of students in high-risk settings. Opportunity Coalitions will invite partners with demonstrated expertise in supporting high-need populations to provide intensive support to transition struggling schools to successful schools. These partnerships will create stability in settings characterized by constant change and foster cultural shifts that promote community, ownership, and pride. Opportunity Coalitions will create place-based, culturally-responsive models that provide experiences that are meaningful and relevant to the target population and generate important insights into what is necessary to support high-need, at-risk populations.

The STEM Center will reach out directly to leaders and communities in high-need settings and extend invitations to form an Opportunity Coalition. Schools must commit to full participation and agree to make significant and lasting changes to ensure that improvements

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are generated and sustained. Opportunity Coalitions will engage in collaboration and learning experiences with other Coalitions to ensure ideas are shared effectively.

Strategy Two Work Strand: Learn from the Field

As the STEM CENTER internet portal, Technical Assistance Network, and Coalitions take form, Field-based Program Managers will help districts, college and universities, and STEM business and industry leaders around the state learn more about the STEM Center and facilitate access to its programs and resources. These field-based efforts will play a significant role in helping the STEM Network grow and will provide valuable insights into factors that influence how to ensure that high-quality resources are implemented with quality and achieve the intended results when disseminated beyond their site of origin.

Teachers on Special Assignment (TOSAs) will be released from their home districts to serve one to two year appointments as Field-based Program Managers and will be housed on-site in regional STEM business or industry workplace settings. These appointments will give experienced, master teachers an intensive year-long learning experience that will further enhance their already well-developed understanding of teaching and learning, expand their network to other STEM sectors and leaders around the state, and renew and refresh their professional commitment to teaching.

As the STEM Center identifies or develops resources related to the network priorities, the TOSAs will reach out to a range of partners: (1) School districts to support STEM teaching and learning; (2) College and universities to support introductory STEM undergraduate coursework or STEM Teacher preparation; and (3) Business and industry to provide real-world connections to STEM and strengthening school to work pathways. Experiences facilitated by the TOSAs will create multiple entry points for diverse organizations with varied degrees of readiness and capacity.

- 1. Create STEM Profiles.** Initial meetings with the TOSA and interested partners will focus on generating a reflective assessment on policies, programs, and practices related to STEM teaching and learning using an audit tool provided by the Center that is also used in the Coalitions. The TOSA will help participants use the audit tool and create an accurate "STEM Profile" that describes their current system strengths and limits. Using the STEM Profile, the TOSA will help the participants identify areas of improvement and map them to resources available from the Center. This initial assessment will be provided by the Center at low (no?) cost and as just an exploration of the Center's services.
- 2. Expand Access to the STEM Learning Network.** After an initial experience creating a STEM Profile, an institution (e.g. school district, college, university, or business) or a coalition of institutions may wish to engage more deeply in the STEM Network. To be awarded services from the internet portal, the Technical Assistance Network or the Coalitions will require a significant level of commitment. They will agree to post their Practice Profile on the internet

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portal to make their assessment, targeted areas to improve, and action plans visible to others within the STEM Network. They will commit to significant levels of participation over time by key stakeholders, including leaders and administrators. They will commit to growth outcomes consistent with the level of participation and the extent of services awarded. They will report on progress toward these outcomes over time and make their progress visible by regular updates to their STEM Profile.

In exchange for these commitments new partners will receive access to assistance in accessing and implementing programs, practices, and policies supported by the Center. Partners will be access support from the Technical Assistance Partners at subsidized rates (variable between programs). They will also be able to access the Studio Sites available at the Coalitions. The TOSAs will facilitate learning experiences before, during and after visits to the Studio Sites to ensure observations are focused, rich, and relevant. They will become active participants in the STEM Network and have access to ongoing face-to-face and on-line dialogue among all the other partners within the network working toward similar goals.

- 3. Peer Networks.** Once partners have formally joined the network, they will be eligible to access the Studio Sites (See Strategy 1 Workstrand) to support practice-based, peer-to-peer learning. Teams will engage in structured protocols, including pre-observation briefings and extensive debriefings, to ensure that the Studio Site observations are closely aligned to each learning team's specific instructional goals. Subsequent to the Studio Site visit, the Field-based Program Managers will help visiting teams prepare action plans to ensure that the observations result in meaningful changes that drive improvements. STEM Center Staff and Coalitions will provide direct support for those plans, but will also broker connections to Technical Assistance Partners to ensure successful implementation.

As the STEM Network grows and the proficiency of partners who enter it also grows, the STEM Center will facilitate the formation of new Coalitions or Studio Sites to reward those who have shown significant growth and to ensure their path to improvement and lessons learned are made available to others. In this way the STEM Network allows multiple pathways for entering the network and multiple pathways for expanding the network.

Strategy Three Work Strand: Inform Policy and Practice

A dedicated, full-time Policy Director will manage a multifaceted policy advocacy and engagement strategy to leverage and sustain the impact of its other programmatic investments. The STEM Center will actively engage in state and national policy discussions aligned with current and projected state priorities for STEM education and workforce. Priorities include:

- Statewide standards, assessments, graduation requirements, and linked longitudinal data systems, that reflect both academic and economic priorities and are aligned with the Common Core Standards and the Data Quality Campaign;

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- More effective pre-service preparation that provides prospective educators with real-world and practice-based learning, not just coursework, and that differentiates the course of study based on the expertise and experience of the candidate;
- Statewide funding and incentives to ensure STEM is a priority for the core competencies expected of all students at all grade levels and to leverage needed improvements in teaching and leadership.
- Improved curriculum tools, such as high-quality curriculum frameworks, lesson plans, and anchor assignments, in all grades and all STEM subjects that make the standards actionable and that link academic rigor with real-world application;
- Better diagnostic assessments that teachers can use to strengthen instruction in real time, accompanied by better classroom- and school-based assessment data storage and analysis tools that are accessible to teachers, administrators, and families;
- Fairer, meaningful, and actionable teacher evaluations that include multiple measures of teacher and student growth to inform teacher support and professional development;
- Professional development models that help teachers engage students and families in rigorous and relevant learning of STEM content that creates opportunities for students to succeed in postsecondary education, secure careers based on workforce projections, and engage as informed citizens in the world of tomorrow;
- Career ladders that help effective teachers advance professionally without having to leave the classroom and compensation plans that recognize and reward excellent teaching and leadership;
- Internships, curricula, practica, and other tools to strengthen school-business-community connections and make learning more relevant.
- Introductory undergraduate STEM courses that reflect projected workforce needs, with demonstrated increases in student success and retention, particularly for underrepresented groups;
- Articulated high school-to-postsecondary education pathways coordinated to meet needs in high-demand fields.

The STEM Center will build coalitions with other organizations (e.g. Stand for Children, League of Education Voters, etc) around these priorities to develop common messaging and strategies for disseminating those messages. The STEM Center will generate policy briefs on critical issues and host policy forums and legislator institutes to ensure policy makers are well informed on issues related to STEM education and workforce needs. The STEM Center will help ensure that policymakers learn from what is working in the field so that new laws, regulations, and public investments will have the greatest impact on the most students.

Strategy Four Work Strand: Create Public Demand

A full time Communications Director will support a robust communication strategy to ensure effective communication internally and externally. Initial efforts will focus on building strong communication materials and messages to raise awareness about the STEM Center, its vision and resources. At the same time, the STEM Center will build effective means of communicating

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among grantees, using print, electronic, and face-to-face strategies, to optimize opportunities for exchanging ideas and resources, facilitating learning and collaboration, and break down isolationism and fragmentation. The Center will coordinate just-in-time interactions among grantees to create dynamic learning networks based on topic, audience, or geography all nested within the overall statewide STEM learning network. As the Center matures, the communications strategies will expand and use broad media campaigns to reach out to parents, students, and communities to build support for STEM education and effective pathways leading into the STEM workforce, including STEM teaching.

PART IV. OPERATIONS

Board of Directors

The Initiative calls for a sea change in K–12 and higher education. This will require a very dedicated, focused, and powerful team — from the board to the staff to the partners. The Board will not function purely for fiduciary oversight, but also as a core strategic resource that adds great value in advancing the organization’s mission. The high-profile board will be drawn from the business, education, STEM, and philanthropic communities with local and national credibility and experience transforming complex systems or organizations. They will be asked to marshal significant resources, to attract a world-class leader to direct the STEM Center, and to oversee the development and initial implementation of a coherent, coordinated, comprehensive, and cost-effective strategy.

Staff

Initial staff hired during 2010 will include:

- Chief Executive Officer to have chief responsibility for fundraising, visibility, policy, communications, and outreach
- Chief Programs Officer to have chief responsibility for program design, implementation, research, evaluation, and quality assurance
- Chief Information Officer to develop and oversee a state-of-the-art internet portal for internal and external communications and dissemination
- Program Directors to oversee the initial awards for Technical Assistance Partners, Learning Coalitions, and Opportunity Coalitions and to provide technical assistance to grantees and unsuccessful grantees with potential.
- Field-based Program Managers distributed regionally to provide support and oversight of Coalitions and to broker and facilitate learning experiences for new partners as they access programs and resources supported by the STEM Center. Teachers on Special Assignment (TOSAs) will be used to fill these roles.
- Communications Director to oversee documentation, dissemination, and visibility
- Policy Director to identify and manage opportunities to influence state and federal policies and budgets

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- Two administrative and one financial staff to provide operational support

Budget

Given the program design articulated above, we propose a three-year budget that significantly ramps up the STEM Center's activities by the third year:

- \$9.28 million in year 1,
- \$18.6 million in year 2, and
- \$26.8 million in year 3.

Of these totals, we are planning for grants and contracts (for Technical Assistance Partners, Learning Coalitions, Opportunity Coalitions, and partnering districts and schools and evaluation) of approximately \$7.5 million in year 1, \$12.8 million in year 2, and \$19.0 million in year 3. Additional program expenditures (for activities such as publications, dissemination, meetings, communications, policy advocacy, etc.) will be roughly \$775,000 in year 1, \$2.4 million in year 2, and \$3.7 in year 3. Together, estimated grants and program expenditures will comprise more than 85 percent of the budget.

Staffing costs will be \$655,000 in year 1 (reflecting the staggered hiring schedule throughout the course of the year), \$3.4 million in year 2, and \$4.3 million in year 3.

Overhead costs (rent, utilities, legal, accounting, etc.) will be kept very low — less than 5 percent of the total budget in year 1, 3 percent in year 2, and 2 percent in year 3.

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APPENDIX A: Considerations for Evidence of Impact

POTENTIAL INDICATORS OF SUCCESS — STAKEHOLDERS AND DESIRED OUTCOMES

Students

- Proficiency in content areas represented by internationally benchmarked standards increases.
- Evidence of significant relationships with adults (outside of family) related to STEM increases.
- Students can create, innovate, and solve problems, such as being able to describe and apply design process and recognition of the value and meaning of “failed” designs and predictions.
- Number and level of STEM courses completed successfully increases.
- Understanding of relevance of STEM learning experience in school to life and careers increases.
- STEM careers increasingly seen as accessible choice/option.

K–12 School Systems

- Instruction reflects practices shown by research to help students become proficient in STEM disciplines and attain 21st-century knowledge, skills, and dispositions.
- Teacher performance evaluation systems inform professional development decisions for individual teachers, reward growth and effectiveness, and drive continuous school improvement.
- Teacher assignments reflect attention to teacher effectiveness and student needs.
- Partnerships with higher education, business, or community organizations create culture of shared responsibility for student success and infuse relevance to school-based learning for college, work, and life.

Higher Education

- University-based and alternative certification pathways increase the (1) quantity of STEM teachers and placement in shortage areas typically underserved; (2) quality of teachers with strong content knowledge instructional skills, and the ability to make classroom learning relevant; (3) diversity of STEM teachers.
- Model teacher evaluation systems assess the level of proficiency in newly certified teachers and inform professional development needs during induction period.
- Undergraduate enrollment in STEM courses without need for remediation increases.
- Retention of freshmen with expressed interest in STEM increases.
- Number of STEM undergraduate majors (two- or four-year degrees) increases.
- Partnerships with K–12 school systems, business, and community organizations create (1) teacher preparation programs that understand and support schools to meet local needs and (2) seamless pathways for postsecondary study of STEM disciplines that are accessible to a diverse population of students and reflect workforce needs.

STEM Business and Industry

- Experiences with diverse sectors of STEM business and industry are accessible and available to students and teachers throughout their K–20 experience in both school and workplace settings.
- Number of STEM graduates who pursue STEM professions increases.
- Local STEM businesses and industries employ increasing number of Washington state graduates.
- Number of new STEM businesses/industries/patents/products emerging from local innovations increases.
- Partnerships with K–12 school systems, higher education, and community organizations create seamless pathways to employment in STEM professions that are accessible to diverse students with different levels of educational attainment.