

# Science, Technology, Engineering and Mathematics (STEM) in Out-of-School-Time Programs in Oregon

A Summary of Data Collected in 2014 by  
Oregon Afterschool for Kids and the Afterschool Alliance

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Oregon**ASK**  
Expanded Learning Partnership



# OregonASK

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This report was prepared for Oregon Afterschool for Kids. More information about OregonASK is available at [www.oregonask.org](http://www.oregonask.org).

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# Summary

Oregon Afterschool for Kids conducted a survey of afterschool programs across the state in summer and fall 2014, using survey questions provided by the Afterschool Alliance. Programs were asked to report about their inclusion of learning opportunities in science, technology, engineering and mathematics. These subjects, often referred to as the STEM disciplines, are increasingly viewed as an integrated set of tools for answering questions and solving problems, which therefore should be taught in an integrated way in both school-day and out-of-school settings.

More than 100 individuals initially responded to the survey; after removing survey responses that were mostly incomplete and ensuring that each program was only represented by a single survey response, the final sample included 84 programs – approximately 11 percent of all programs in the state.

This is the first attempt to collect systematic data from afterschool programs in Oregon about their delivery of STEM learning opportunities to students in informal settings. The extent to which these survey findings are representative of all afterschool programs in Oregon is unknown, but the study did capture a snapshot of a substantial portion of afterschool programs in the state in 2014.

Almost half of the programs in the sample (45 percent) are operated by non-profit organizations. Slightly more than a quarter (26 percent) are operated by public K-12 schools. Government agencies (parks and recreation departments, public libraries, etc.) operate 24 percent of the represented programs, while 5 percent are operated by institutions of higher education.

## Afterschool Programs Without STEM Learning Opportunities

The survey was primarily targeted to find out more about the afterschool STEM learning opportunities that are available to youth in Oregon, but programs were encouraged to participate even if they did not offer STEM activities at the time. Eighteen representatives responded to questions about why their programs don't offer STEM activities, whether they would like to offer STEM activities, and what kinds of support might make this more possible.

**Barriers to Afterschool STEM Learning Opportunities.** Key barriers cited by those whose programs don't offer STEM learning opportunities included a lack of qualified staff, lack of knowledge about STEM curriculum, and lack of funding for STEM curriculum.

**Options for Increasing Access to Afterschool STEM Learning.** The highest ranking ways to support greater access to STEM learning opportunities were more time to discuss STEM with colleagues, better access to STEM experts, more opportunities for staff professional development in STEM, greater conviction that STEM learning is important in afterschool settings, more support from supervisors and stakeholders, more funding in general, and more funding specifically for STEM curricula.

## Afterschool Programs With STEM Activities

Responses from 66 programs that reported providing STEM learning opportunities to youth in Oregon are the focus of this report.

**When, Where, and to Which Grade Levels, are STEM Programs Offered?** All 36 counties in Oregon were represented in the survey sample by at least one program that offers STEM learning opportunities to youth in an out-of-school setting. Six counties are served by 10 or more of the programs in the sample.

Most of these programs (80 percent) offered STEM learning opportunities immediately after school; many also offered STEM programming in summer (70 percent), on weekends, (39 percent), or in the evening (36 percent). Two thirds of this sample reported delivering their programming in school buildings, while 25 percent reported program sites located in community centers and 25 percent provided activities at local cultural institutions such as science centers, museums, or libraries. Other locations included recreation centers, university campuses, businesses, parks or other outdoor locations such as camps, faith-based organizations, and private homes.

Programs reported offering STEM activities to students at all grade levels; 73 percent of programs reported serving students in grades 6-8, with slightly fewer (64 to 67 percent of programs) reporting offering services to students in elementary grades 1-5, and 58 percent of programs serving high school students.

**How Many Students Are Served?** About a third of the programs in this sample reported serving 150 or fewer students per year; another third reported serving 151 to 1000 students per year, and the remaining third of these programs reported serving more than 1000 students per year.

**Program Goals and Disciplinary Focus.** Some programs are operated at multiple sites; 60 percent of responding programs reported that they offer the same STEM programming at all sites, while 40 percent vary their programming by site. Programs were asked to report their goals for youth development using a checklist of typical goals for similar programs. The most frequently endorsed goals (reported by more than 75 percent of programs) were developing youth interest and skills in STEM activities, developing their abilities to solve problems and work as a team, and developing their STEM knowledge and positive self-image with regard to STEM. Other goals (endorsed by 59 to 69 percent of programs) included developing in youth an understanding of the relevance of STEM to everyday life, improving academic performance in STEM fields, developing an understanding of STEM careers, and developing an awareness of opportunities to contribute to society through STEM.

Programs were also asked to report which of the STEM fields were a focus for their activities. More than half (55 percent) reported a strong focus on science. An engineering focus was reported by 41 percent of programs; a technology focus was reported by 36 percent, and a mathematics focus was reported by 21 percent of responding programs. When asked "how often are science, technology, engineering, and mathematics integrated with one another," 57 percent reported "always" or "often."

**Curriculum and Use of Educational Standards.** Most programs reported that they developed their own curriculum (47 percent) or used a combination of curriculum materials developed by outside organizations and their own locally produced lessons and activities (40 percent); only 14 percent of programs reported exclusively using materials developed by outside organizations.

Almost two thirds of these programs reported that they use some kind of formal educational standards to guide their offerings. The Oregon state standards and the closely related Next Generation Science Standards (NGSS) were the most frequently endorsed, with nearly 40 percent of programs reporting their application to out-of-school learning. Common Core standards for math were reported in use by 29 percent of programs, along with Common Core standards for English language arts (22 percent of programs.)The Computer Science Teachers Association (CSTA) K-12 Computer Science Standards were reported by 14 percent of respondents (9 programs).

**Format, Duration, and Extent of STEM Instruction Offered.** Nearly thirty percent of this sample indicated that their STEM programs were delivered in a focused, stand-alone format, while more than a third (24 percent) reported that their STEM learning opportunities were provided as part of a larger, comprehensive afterschool program in which one or more STEM electives were offered to interested

youth. Occasional group or individualized activities were reported as STEM programs by 15 percent of respondents (10 programs).

Duration of specific STEM learning activities varied widely, e.g. from 15 minute lessons to week-long camps to even longer internships or projects. The most commonly reported activity length was one hour, and 58 percent of respondents endorsed activity lengths of 2 hours or less.

In terms of total hours of STEM instruction offered to students during the school year, nearly a third of programs reported providing up to 20 hours of instruction; 59 percent reported 40 or fewer hours of instruction during the school year. For summer program offerings, half of responding programs (51 percent) reported providing up to 20 hours of instruction per student; 70 percent of programs reported providing 40 or fewer hours of instruction.

**Target Demographics.** Programs were asked about the “target demographics” they recruited into their activities. The most frequently endorsed groups were females (recruited by 67 percent of programs), males (58 percent), and “underrepresented ethnicities in STEM” (recruited by 50 percent of programs). Other groups endorsed by 25 percent or more of responding programs included English language learners, rural youth, students with disabilities, urban youth, and suburban youth.

**Funding.** More than half (51 percent) of programs reported receiving financial support from private foundations, while 44 percent reported funding from business sponsorships. Parent fees were reportedly in use by 39 percent of programs, along with individual gifts (reported by 38 percent of programs). Fundraising events, state or city government funding, support provided through the federal (state-administered) 21<sup>st</sup> Century Community Learning Centers program, and local school or school district funding were cited by 21 to 33 percent of programs. For those programs that charge families a fee, most appear to have some options for providing scholarships or discounts to make their programs more affordable for low-income youth.

**Instructional Staff Background and Professional Development Needs.** Programs reported a mix of paid and volunteer instructional staff, including professional afterschool instructors, volunteers from the community, STEM professionals or teachers from local schools who might be paid or might be serving as volunteers in the afterschool setting, and students capable of acting as instructors for peers or younger children. STEM professionals were most often engaged as lead teachers, but also contributed through curriculum development, mentoring, co-teaching, providing workplace visits or tours, and providing classroom support.

Nearly half of the programs that responded to the survey reported that fewer than 25 percent of their instructional staff have a background, training, or experience in the STEM fields. Professional development in STEM for afterschool staff or volunteers was reportedly provided by 64 percent of these programs; conversely, 36 percent of these programs reported providing no STEM training for their instructional staff. Reasons for not providing training to instructional staff included lack of time or funding, lack of access to professional development providers, perceived lack of need (e.g. use of scripted science kits and belief that no training is needed for staff when these kits are used), or programs being in early stages of development.

Among those programs that do provide some professional development for instructional staff members, 75 percent reported that these opportunities were provided once a year (35 percent) or less than once per year (40 percent). As might be expected given those findings, “staff training” was the most frequently endorsed professional development need, cited by 69 percent of programs. Other needs for professional development included networking opportunities, research on best practices, technical assistance, and assistance on using educational standards.

**Partnerships.** Partnerships are important for these programs; 82 percent reported partner involvement. The most frequently reported partner types were business or corporate partners (reported by 48 percent of programs), as well as colleges or universities, school-day STEM teachers, and science centers or museums. The major contributions of these partners included expertise and volunteers, but they also frequently provided materials, curriculum, advocacy, funding, or training.

**Evaluation.** Two thirds of programs that responded to this survey reported that they conduct evaluations of their STEM program. More than half of these were internal self-assessment studies; 15 percent reported evaluation research conducted by an external expert. Most evaluation research reportedly focused on student attitudes and behavioral intentions, along with attendance and demographic information. Fewer than half of the programs reported collection of data on knowledge, skills, academic achievement, or fidelity of program implementation. Reasons for not conducting evaluation research on STEM learning included lack of resources, programs still in early stages of development, and evaluating comprehensive afterschool programs as a whole rather than drilling down to evaluate specific STEM learning activities or electives.

More detailed information on each of these topics is available in the full report, available from Oregon Afterschool for Kids.