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

OregonASK
Expanded Learning Partnership

CEDAR LAKE
RESEARCH GROUP LLC

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This report was prepared for Oregon Afterschool for Kids. More information about OregonASK is available at **www.oregonask.org**.

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Cedar Lake Research Group LLC provides assistance in strategic planning, program design, research design and analysis, program and project evaluation, and communication: **www.cedarlakeresearch.com**.

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Summary

Oregon Afterschool for Kids conducted a survey of afterschool programs across the state in summer and fall 2014, asking about their inclusion of learning opportunities in science, technology, engineering and mathematics. These subjects, often referred to as the STEM disciplines, are increasingly taught as an integrated set of tools for answering questions and solving problems. Representatives of 84 programs completed the survey – approximately 11 percent of all programs in the state. The extent to which these survey findings are representative of all programs in Oregon is unknown, but at a minimum, the study captured a snapshot of a substantial portion of afterschool programs in the state in 2014.

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 Without STEM Activities

THIS SECTION STILL TO BE WRITTEN

More detailed information on each of these topics is available in the full report.

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Introduction

During the latter half of 2014, Oregon Afterschool for Kids (Oregon ASK – www.oregonask.org) surveyed a sample of afterschool programs across the state regarding their inclusion of science, technology, engineering and mathematics (STEM) activities in their offerings for students. The survey, designed by the Afterschool Alliance (www.afterschoolalliance.org), was administered through an online survey system. Most of the individuals who participated represented afterschool programs that offer STEM activities, but a subset of respondents worked for organizations that currently do not offer STEM as part of their afterschool programs.

The survey was promoted in Oregon as the "STEM Mapping Survey 2014" and was described to those invited as an effort to

> "gather data on out-of-school-time programs in Oregon that offer science, technology, engineering, and mathematics (STEM) opportunities to school and college-aged children. The goal of this survey is to capture, for the first time, a comprehensive picture of the informal STEM learning opportunities in Oregon. General areas of data collection include: General Program Information, Youth Participation, Program Design and Delivery, Funding and Costs, Staff and Professional Development, Partnerships, and Evaluation. This survey will identify where out-of-school-time STEM opportunities exist in Oregon and where there are gaps to be filled, as well as document the needs of existing programs."

Who Participated in The Survey?

All of the approximately 750 afterschool programs in Oregon were invited to participate. Representatives of 84 programs completed the survey – approximately 11 percent of all programs in the state. Because this is not a random sample, the findings reported here may or may not be representative of all programs in Oregon, but at the least they represent a substantial portion of programs in the state.

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.

Of the individuals who answered the survey on behalf of these organizations, 46 percent reported working as upper-level administrators, 27 percent reported working as mid-level administrators, 14 percent described their jobs as direct service positions working directly with children, and 4 percent were providers of professional development or other capacity-building functions; 8 percent held multiple roles.

Afterschool Programs Without STEM Learning Opportunities

Although the survey was titled "STEM Mapping Survey 2014" and was described to potential respondents as an effort to "gather data on out-of-school-time programs in Oregon that offer science, technology, engineering, and mathematics (STEM) opportunities," representatives of programs that do not currently offer STEM opportunities for their students were encouraged to participate and responses were collected from 18 such programs. This section summarizes their responses 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.

Although this finding may be a function of sampling error – i.e., it may be peculiar to the non-random, self-selected group of programs that responded to the survey – it is worth noting that in this particular sample, programs operated by government agencies or public K-12 schools were significantly less likely to include STEM activities than programs operated by non-profit organizations or institutions of higher education. In response to the question "Is STEM an intentional part of your afterschool program?" 46 percent of programs operated by government agencies and 36 percent of programs operated by public K-12 schools reported that they do not include STEM activities in their offerings. In contrast, 10 percent of programs operated by non-profit organizations and none of the programs operated by institutions of higher education reported that they do not include STEM learning opportunities in their programs.

Barriers to Afterschool STEM Learning Opportunities

Lack of qualified staff members and lack of STEM curriculum were cited as barriers to offering STEM programming in afterschool settings. Table 1 lists the specific barriers that were offered as choices in the survey. Almost 40 percent of those whose programs don't offer STEM learning opportunities cited a lack of qualified staff, lack of knowledge about STEM curriculum, and lack of funding for STEM curriculum as barriers.

Similar concerns were evident in four comments describing "other" reasons for not including STEM: *"I am not sure of all of the specifics of STEM programming," "Not our area of focus; the district may be doing STEM specific curriculum that I am not aware of," "Unaware about STEM,"* and *"Would have to fit with current programming, e.g. tutoring."*

Lack of time for STEM programming was cited by 28 percent of respondents.

Table 1. Reasons Cited for Not Offering STEM Learning Opportunities

Why does your program not currently offer STEM?	Percent
Do not have qualified staff	39 %
Do not know of an appropriate STEM curriculum	39 %
Do not have funding for STEM curriculum	39 %
Do not have time for STEM program	28 %

Note. N = 18 survey responses from organizations that do not offer STEM learning opportunities.

Options for Increasing Access to Afterschool STEM Learning

Of the 18 programs that currently do not provide STEM learning activities for students, 11 respondents (61 percent) reported that they are interested in offering STEM as part of their programs.

(Three of the seven participants who reported a lack of interest gave specific reasons why they might not wish to incorporate STEM in their programs: *"I don't think this site would be an appropriate one but I'm open-minded," "'Maybe' is the more appropriate answer; I'm unsure how to add STEM components strategically without sacrificing our core mission,"* and *"Not enough time."*)

Survey respondents who indicated an interest in adding STEM learning opportunities to their afterschool programs were then asked to rank the impact of ten specific resources that might help them move toward this goal. Table 2 presents these ten resources. Those that were most frequently ranked among the top five most helpful resources are listed at the top. Highlights include the following:

- More time to discuss STEM with colleagues was deemed to have the greatest impact; this was ranked among the most helpful resources by eight of 11 respondents (73 percent).

- Better access to STEM experts and more opportunities for staff professional development in STEM were ranked highly by 64 percent of this group.

- Greater conviction that STEM learning is important in afterschool settings, along with more support from supervisors and stakeholders and more funding (generally and specifically for STEM curricula) were ranked as having high impact by 54 to 60 percent of these program representatives.

- Potential resources that were less frequently ranked as having high impact included more on-site STEM technical assistance, better access to online STEM resources, more time for STEM activities, and more time to study STEM.

Table 2. Ranking of Resources to Support Afterschool STEM Learning Opportunities

Of the following resources, which would have the greatest impact on your likelihood of implementing STEM?	Percent of Respondents Ranking This Among the Top 5 Most Helpful Resources
More time to discuss STEM with colleagues	73 %
More opportunities for staff to attend STEM trainings and workshops	64 %
Better access to STEM experts	64 %
Greater conviction that STEM is important to out-of-school-time children and youth	60 %
More support from funders, supervisors, and other stakeholders	54 %
More money to purchase STEM curricula	54 %
More on-site STEM technical assistance	46 %
Better access to online STEM resources	36 %
More time for STEM activities	27 %
More time to study STEM	18 %

Note. N = 11 survey respondents from organizations that currently do not offer STEM learning opportunities but would like to do so.

Afterschool Programs With STEM Learning Opportunities

All of the approximately 750 afterschool programs in Oregon were invited to participate. Representatives of 84 programs completed the survey – approximately 11 percent of all programs in the state. Of the 84 programs that responded, 66 reported providing STEM learning as part of their programs. This section summarizes their responses to questions about their STEM programming. Sample size for specific questions varies and is noted with each table.

Because this is not a random sample, the findings reported here may or may not be representative of all programs that provide STEM afterschool learning opportunities in Oregon, but at the least they represent a substantial portion of such programs in the state.

Location of STEM Afterschool Programs

Program representatives were asked to indicate the counties in which they provided STEM learning activities. As noted in Table 3, all 36 counties in Oregon were represented in the survey sample by at least one program. Five or more STEM programs were reported to be operating in 12 Oregon counties, while in the remaining 24 counties, 1 to 4 programs reported providing STEM learning.

Table 3. Number of Responding Afterschool STEM Programs by Oregon County

Counties served by 10 or more afterschool STEM providers that responded to this survey	Clackamas Deschutes Lane Marion Multnomah Washington
Counties served by 5 to 9 afterschool STEM providers that responded to this survey	Benton Josephine Lincoln Linn Polk Yamhill
Counties served by 1 to 4 afterschool STEM providers that responded to this survey	Baker Jefferson Clatsop Klamath Columbia Lake Coos Malheur Crook Morrow Curry Sherman Douglas Tillamook Gilliam Umatilla Grant Union Harney Wallowa Hood River Wasco Jackson Wheeler

Note. N = 66 organizations that offer afterschool STEM learning opportunities.

Schedules and Numbers of Student Served

"Afterschool" programs may provide services after school, before school, in the evening, during the summer, on weekends, or at other specified times. Program representatives were asked to report when they offer STEM learning opportunities. There responses are tabulated in Table 4.

Most of these organizations, 80 percent, offered STEM learning opportunities immediately after school. Many also offered STEM programming n summer (70 percent), on weekends, (39 percent), or in the evening (36 percent). Only 15 percent reported offering STEM programming immediately before school hours. Among the "other" schedules that were noted, several programs reported offering STEM programming during the school day; during school holidays, vacation breaks, or in-service days; and during special events such as occasional family night programs.

Table 4. Scheduling of STEM Learning Opportunities

When do you offer STEM learning opportunities in your program?	Percent
After School	80 %
Summer	70 %
Weekends	39 %
Evenings	36 %
Before School	15 %
Other	23 %

Note. N = 66 organizations that offer afterschool STEM learning opportunities.

About a third of the organizations that responded to the survey reported having only a single site at which afterschool programs were offered. Approximately another third offered programing at 2 to 6 sites, while the remaining organizations offered programming at more than six sites, up to a maximum of 75. Of those that serve multiple sites, all but two reported providing STEM learning opportunities at more than one location.

Table 5 presents information on the total number of students served by these programs. About half of the programs reported serving a total of 500 or fewer students annually, while 14 percent (9 programs) reported serving more than 4000 students each during a year. When asked "how many children regularly participate in STEM activities in your program each week across all sites," the respondents reported an average of 360 students in after school programming and 374 students in summer programming.

As displayed in Table 6, about two thirds of the programs offered afterschool STEM learning opportunities for students of each grade range. (Among those responding with "other," several included pre-K students, kindergarteners, college or multigenerational audiences; some reported grade spans that don't neatly fall into the categories offered, i.e. grades 3-5.)

Table 5. Number of Students Served by Afterschool STEM Programs

How many students are served annually by this program across all sites?	Percent	Cumulative Percent
Less than 30	12 %	12 %
31 to 50	3 %	16 %
51 to 100	8 %	23 %
101 to 150	9 %	33 %
151 to 200	5 %	38 %
201 to 300	5 %	42 %
301 to 400	2 %	44 %
401 to 500	8 %	52 %
501 to 1000	16 %	67 %
1001 to 2000	5 %	72 %
2001 to 3000	9 %	81 %
3001 to 4000	5 %	86 %
More than 4000	14 %	100 %
How many children regularly participate in STEM activities in your program each week across all sites?		
	Range	**Mean (Standard Deviation)**
After School	0 to 3100	360.32 (554.92)
Summer	0 to 4000	373.94 (674.72)

Note. N = 64 organizations that offer afterschool STEM learning opportunities. Percentages may not add to cumulative percentages due to rounding

Table 6. Age of Children Offered Afterschool STEM Programs

What is the age of the children and youth reached in your STEM offering?	Percent
Grades 1-3	64 %
Grades 4-5	67 %
Grades 6-8	73 %
Grades 9-12	58 %
Other	20 %

Note. N = 66 organizations that offer afterschool STEM learning opportunities.

Program Designs

Sixty percent of respondents reported that the same STEM curriculum or program is offered at all of their sites, while 40 percent reported that different activities are offered at different sites.

Youth Development Goals. Table 7 displays the proportion of responding organizations that endorsed specific goals for their programs. Developing youth interest in STEM activities was the most frequently endorsed goal (93 percent of programs). Among the "other" goals listed were providing access to STEM opportunities for students of color, exposing youth to hands-on work in STEM subjects, and developing in youth "a conservation ethos and a connection with nature."

Table 7. Afterschool STEM Program Goals

Which, if any, of the following are goals for your program?	Percent
Youth develop interest in STEM activities	93 %
Youth develop STEM skills	83 %
Youth demonstrate problem-solving skills	83 %
Youth strengthen abilities to work as a team	81 %
Youth develop STEM knowledge	78 %
You develop positive self-image towards STEM	78 %
Youth develop an understanding of relevance of STEM to everyday life	69 %
Youth improve academic performance in STEM areas	67 %
Youth develop an understanding of STEM careers	59 %
Youth develop awareness of opportunities to contribute to society through STEM	59 %
Other	4 %

Note. N = 58 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer.

STEM Discipline Focus. As displayed in Table 8, 55 percent of the responding programs reported that among the four STEM disciplines, their program focus was mostly on science. A focus on engineering was reported by 41 percent, while 36 percent reported a focus on technology and 18 percent reported mostly focusing on math. Among the 21 percent who indicated an "other" focus, most listed some blend or balance of the four disciplines, or a focus that varies at different times of year or different grade levels. When asked "how often are science, technology, engineering, and mathematics integrated with one another, 16 percent reported "always," 41 percent reported "often," 32 percent reported "sometimes," 2 percent reported "seldom," and 5 percent reported "never;" 4 percent were unsure.

Curriculum. Almost half of these programs reported using curricula and lesson plans developed in-house (see Table 9). Most of the rest reported a combination of in-house and externally developed materials. Most of the programs (71 percent) do not provide curriculum materials for others to use, but 29 percent (17 of the 58 who responded to this question) do have established curricula or programs available for use by other afterschool providers.

Table 8. Content Focus Within STEM Disciplines

On which aspect of S-T-E-M does the program primarily focus?	Percent
Mostly science	55 %
Mostly engineering	41 %
Mostly technology	36 %
Mostly math	21 %
Other	21 %

Note. N = 56 organizations that offer afterschool STEM learning opportunities.
Respondents were allowed to mark more than one answer.

Table 9. STEM Curriculum Type

What type of STEM curricula, toolkit, or lesson plans do the programs use?	Percent
Developed in-house	47 %
Developed outside of organization (free)	5 %
Developed outside of organization (cost)	9 %
Combination	40 %

Note. N = 56 organizations that offer afterschool STEM learning opportunities.
Percentages may not add to 100 due to rounding.

Use of Educational Standards. Use of state or national core education STEM standards was reported by 66 percent of programs. The Next Generation Science Standards and the related Oregon state-specific standards were cited by 38 percent and 34 percent of respondents, respectively. Also cited were Common Core Math standards (by 29 percent of programs), Common Core English Language Arts standards (by 22 percent), and the Computer Science Teachers Association (CSTA) K-12 Computer Science Standards (by 14 percent of respondents). Beyond these choices offered by the survey, nine percent of respondents also noted "other" responses including "Advanced Placement and tutoring in alignment with classroom curriculum," the National Educational Technology Standards (NETS), and having plans to align with NGSS or Common Core.

Among the 34 percent of programs not using standards, when asked why they are not, 50 percent reported not having resources or time to use standards, and 25 percent reported not having training or understanding of standards. Other reasons listed by the remaining 25 percent of respondents generally addressed a different type of focus for afterschool programming, e.g. providing recreation and building motivation and interest, for which standards and specified learning outcomes were viewed as inappropriate.

Site Location. Most programs were delivered in school buildings (67 percent; see Table 10.) Community centers, cultural centers such as libraries or museums or science centers, or recreation centers were also frequently cited locations, as well as universities and business workplaces. Among the "other" locations noted were at parks, camps, or other outdoor locations, as well as in homes or varying locations.

Table 10. Program Location

Where is the STEM program delivered?	Percent
School building	67 %
Community center	25 %
Cultural institution such as science center, museum, or library	25 %
Recreation center	17 %
University	13 %
Business workplace	12 %
Faith-based organization	2 %
Other	16 %

Note. N = 58 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer.

Program Format. With regard to program format, almost a third of respondents reported a stand-alone STEM afterschool program (see Table 11). Multiple electives available within a comprehensive afterschool program were reported by 22 percent along with another 12 percent reporting a single STEM-related elective option within a comprehensive afterschool program. Periodic lessons or individual activities were reported by 15 percent. Among the 22 percent who reported "other" formats were a wide variety of options including camps, multiple combinations of the choices offered, and other formats. (N=59 for this question).

Table 11. Program Format

In what form do you provide structured STEM programming?	Percent
Stand-alone STEM afterschool program	29 %
Multiple electives within comprehensive afterschool program	22 %
Lessons or individual activities offered periodically	15 %
Elective within comprehensive afterschool program	12 %
Other (individual comments included the following: • *A variety of ways not listed* • *Any way we can* • *Camps and workshops* • *Daily STEAM hour at each location* • *Individual activities offered during open hours* • *Integrated into daily lessons* • *Mandatory 2x week in afterschool program* • *Sleepover programs and scheduled programs for guests* • *Stand alone afterschool, during school and summer programming* • *Stand alone and as component of afterschool programs* • *Stand-alone afterschool and weekend programs* • *Summer camps* • *We provide STEM experience in schools, with schools on field trips, and outside of school times as well*	22 %

Note. N = 60 organizations that offer afterschool STEM learning opportunities.

Duration and Extent of Learning Opportunities. Respondents were asked to categorize the typical length of a student STEM learning experience in their programs. The most frequent response was one hour. Commensurate with the varied nature of programs in the sample, almost a quarter of respondents chose "other" and explained answers that did not fit into the standard response options, many of them variable durations that depended on context. See table 12 for details.

An additional questions asked whether parents or families are involved in the STEM program; 48 percent of programs reported involvement of parents or families.

Table 12. Duration of Student STEM Learning Opportunities

How long do your STEM learning experiences usually last?	Percent
30 minutes	8 %
45 minutes	8 %
1 hour	32 %
1.5 hours	10 %
2 hours	12 %
2.5 hours	2 %
3 hours	3 %
4 hours	2 %
Other (individual comments included the following: • *15 minutes to 15 hours.* • *40 hours per week internships.* • *7-14 days (residential, overnight programming).* • *All day.* • *Depends on the teacher.* • *Elementary - 30 minutes; middle school 1.5 hours.* • *Lengths of the programs vary on the kids' age group and topics; usually 45-60 minutes but can run longer.* • *Most participants will work 40-100 hours over the course of six months.* • *Summer and vacation periods: 15hr/week/class; school year ~3 hour/week for ~9 weeks; individual summer and holiday camps are 6-8 hour/day for one week. In the summer, registrations are half individual classes and half all day camps. Many children take both morning and afternoon classes.* • *Varies by age group: 30 minutes to 2 hours.* • *Varies depending on activity. Camps last all day. Demonstrations last about 1 hour. Workshops last 1-2 hours.* • *Vary by site. Some are 1hr. Summer camps 2-3 hours to 5-8 hours.* • *We have a host of experiences that last anywhere from a 2 hour workshop to a 9 month project.* • *We specialized in free-choice learning. Experiences vary with the needs of the learner. Often we see the same learner at various times of the year, increasing the effective length of any individual experience.*	23 %

Note. N = 60 organizations that offer afterschool STEM learning opportunities.

Respondents were also asked to categorize the estimated total amount of hours of STEM instruction that each student in their program receives during the school year (Table 13) and during the summer (Table 14).

Most estimates for hours of student instruction during the school year were in the 1 to 20 hour category (31 percent of programs) or the 20 to 40 hour category (28 percent of programs). For summer STEM learning experiences, most responses were in the 1 to 10 hour category (22 percent of programs) or the 10 to 20 hour category (29 percent of programs). Those responding "other" to these questions noted variable amounts of instruction depending on the activity, school, or program.

Table 13. Total Hours of STEM Instruction Offered During the School Year

How many hours of STEM instruction do you estimate each student receives each year from this program during the school year?	Percent
1 to 20	31 %
20 to 40	28 %
40 to 60	10 %
60 to 80	3 %
80 to 100	3 %
More than 100	12 %
None during the school year	5 %
Other	7 %

Note. N = 58 organizations that offer afterschool STEM learning opportunities. Percentages may not add to 100 due to rounding.

Table 14. Total Hours of STEM Instruction Offered During the Summer

How many hours of STEM instruction do you estimate each student receives each year from this program during the school year?	Percent
1 to 10	22 %
10 to 20	29 %
20 to 30	12 %
30 to 40	7 %
40 to 50	3 %
More than 50	9 %
None during the summer	12 %
Other	5 %

Note. N = 58 organizations that offer afterschool STEM learning opportunities. Percentages may not add to 100 due to rounding.

Target Demographics. When asked about target demographics, respondents emphasized girls (67 percent), boys (58 percent), and underrepresented ethnicities (50 percent) as displayed in Table 15.

Table 15. Target Demographics

What are the target demographics for your program?	Percent
Females	67 %
Males	58 %
Underrepresented ethnicities in STEM	50 %
English Language Learners	32 %
Rural populations	32 %
Students with disabilities	28 %
Urban populations	27 %
Suburban populations	25 %
Other (individual comments included the following: • *All.* • *All students.* • *Anyone who is interested.* • *At risk populations (due to poverty, language, etc.)* • *At-risk youth.* • *Elementary students grades 1-5* • *Homeless, LGBTQ, incarcerated, autism spectrum.* • *Low income.* • *Low SES.* • *Many after school students are Hispanic but we teach in English.* • *No target.* • *Students in our school district.* • *Students that show an interest.* • *Students who qualify for free or reduced price lunch.* • *This program is open to all interested students - not sure there is a targeted audience.* • *We are open to all.* • *We don't have a target demographic although we do specifically try to recruit and engage students who belong to groups underrepresented in the physical sciences.*	28%

Note. N = 58 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer

Funding

Organizations offering afterschool STEM learning opportunities reported an array of funding to support their programs; see Table 16. Just over half reported funding from foundations; another 44 percent reported support from business or corporate sponsorships. Parent fees, individual gifts, fundraisers and state or city government funding were also each reported by a third or more of the programs.

Table 16. Funding Sources

Which of the following funding sources do you access to offer your STEM programming?	Percent
Private philanthropic foundation	51 %
Business/corporate sponsorships	44 %
Parent fees	39 %
Individual gifts	38 %
Fundraisers	33 %
State or city government funding stream	33 %
U.S. Department of Education's 21st Century Community Learning Centers (21CCLC)	23 %
School or school district	21 %
Other federal funding (e.g., NSF, NASA, Department of Defense, etc.)	7 %
Child Care Development Fund	-
Other	16 %

Note. N = 61 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer.

In response to a separate question asking "Does the program charge fees to participate" 49 percent answered affirmatively. Presumably some of these responses are referring to fees charged to schools rather than to parents, which would explain the difference between this and the 39 percent in Table 16 who noted charging parent fees.

Most programs appear to have some ability to provide scholarships or discounts for some students. Of 30 programs that responded to an open-ended question on this topic, 25 (83 percent) described some form of assistance available to families to make their programs more affordable.

Staff and Professional Development

Table 17 displays the type of instructional staff reported by programs. The most frequently reported type of instructional staff was "other paid instructor" at 48 percent of programs, followed by volunteer community members and volunteer STEM professionals (33 percent of programs each) and school-day teachers paid to serve in the afterschool program (30 percent of programs). Comments to the "Other" response included librarians, afterschool program administrators, AmeriCorps member, college students, science center staff, and models in which community or STEM volunteers coach the program staff who in turn provide instruction to students.

Table 17. Instructional Staff

Who provides the STEM instruction in your program?	Percent
Other paid instructor	48 %
Community member (volunteer)	33 %
STEM professional (volunteer)	33 %
School-day teacher (paid)	30 %
Unpaid instructor (volunteer)	25 %
STEM professional (paid)	23 %
Peer (student)	11 %
School-day teacher (volunteer)	10 %
Other	20 %

Note. N = 61 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer

When STEM professionals were involved in these programs, they most frequently served as lead teachers or curriculum developers; see Table 18. Other roles included mentoring, co-teaching, and providing workplace visits or classroom support.

Table 18. Involvement of STEM Professionals

If STEM professionals are involved in your STEM program, in what capacity do they participate?	Percent
Lead teaching	44 %
Curriculum development	39 %
Mentoring	36 %
Co-teaching	33 %
Workplace visits or tours	30 %
Classroom support	23 %
Other	4 %

Note. N = 61 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer.

NOTE TO READERS OF THIS DRAFT: THERE IS STILL QUITE A BIT OF WORK TO BE DONE FROM THIS POINT FORWARD; INTERPRETIVE COMMENTS ARE MOSTLY NOT WRITTEN YET. EARLIER SECTIONS WILL ALSO BE UPDATED SOMEWHAT IN LATER DRAFTS, AND FORMATTING WILL BE BETTER.

Among these programs, 64 percent reported providing training or professional development for STEM instructors, while 36 percent reported not providing training for instructors (N=61). Reasons given for not providing professional development included:

- *Our members volunteer to help. Most are retired teachers or have grandchildren so they are familiar with working with young children. I prepare the lessons and instruct the other 'teachers' on the curriculum if needed (some did not know a prism from a pyramid, etc.) and assign tasks to the volunteers based on their comfort level.*
- *Not the primary mission of the program.*
- *Not available in our immediate area.*
- *They are busy--not sure they would come to any training we offered.*
- *Lack of resources.*
- *They are not employed by the library, thus we do not provide them professional development. If librarians are leading the program, some limited professional development is available.*
- *Don't know how to access it.*
- *The science kits we use have very clear directions. Anyone who works with our program has the skills to open the box, read the directions, and facilitate the activities.*
- *Can't afford it or don't know about it.*
- *We hire outside individuals/groups or collaborate with organizations who have the skills we're looking for.*
- *Training comes with the materials (printed and webinar) but no other training is provided.*
- *Volunteer hours - only have so many.*
- *Hasn't been addressed, training time and/or professional development, once established will likely be added.*
- *Time, cost constraints.*
- *We provide teachers with our in-house curriculum and are available for support throughout the camp. We work with them to ensure that they have the necessary background knowledge. We strive to hire working teachers or those with classroom experience so that we draw on their management skills.*
- *We haven't yet incorporated this aspect into our programming, but are working on it. For folks who aren't familiar with our agency, we do an introductory training on our mission, values and agency expectations.*
- *No funds.*
- *We don't have the staff or resources to offer training.*
- *Scale of program.*
- *STEM curriculum developed as a pilot program. Training will be provided once the curriculum has been refined.*
- *We offer optional conferences and trainings to our front line staff. Our program is designed to use STEM on an informal basis with the flexibility to create our own curriculum. We do not currently receive STEM grants or funding but still use pieces of STEM curriculum.*

For those programs that do provide professional development for their instructors, responses to "What kind of training is provided and by whom?" are listed below: *[Note these must still be cleaned up and summarized; just pasted in for now]*

- *AKA Science staff facilitate the following hands-on trainings for instructors: New Leader Training (1 hour): Class Leaders receive an explanation of how AKA Science works and an experiential introduction to inquiry-based instruction. Class Leaders attend this training the very first time they teach an AKA Science class.   Curriculum Training (3 hours): Class Leaders review updates to documents and processes, then work together through the specific activities in the curriculum. Class Leaders attend this training prior to each class that they teach, since topics rotate from term to term and curriculum is updated from year to year.*
- *Volunteer orientation; mentoring from educators*
- *Our lead teacher trains new instructors - they shadow classes to learn the curriculum - then we let them teach on their own while the lead teacher is in the classroom until we feel comfortable with the new instructor working on their own. New instructors can access lesson plans and minute to minute timelines in our curriculum database, too.*
- *OSU*
- *all staff receive training 2 times per year and as needed*
- *In-state training through various sources*
- *Program managers (retired teachers) provide group training at the start of the school year and ongoing training throughout the year onsite.*
- *by the companies we use*
- *AKA science*
- *training by Oregon Ask and the science teacher goes to an annual training.*
- *Instructors are assisted by me (SUN STEM TOSA) in writing standards-based assessments for their classes, so that we can report to the Department of Education regarding the amount of students progress made throughout the term of study. Instructors of AKA Science kits attend the trainings presented by Impact Northwest. Other curricula have attending videos online, which provide the background needed to present the classes. Any further help needed is provided by me (SUN STEM TOSA).*
- *Current Mentor Community Volunteers who have been trained through other programs.*
- *Through STEM hub, partners (i.e. Aquarium)*
- *I would need to ask our science instructors*
- *nConnect provides industry mentors and AmeriCorps volunteers pre-activity coaching and training as appropriate*
- *OSU Extension Services STEM coordinators train staff*
- *Conferences ODE support SEEDs grant research group*
- *Full time education staff participate in professional development each year from a variety of sources- NAI, AZA, etc. Part-time staff and volunteers receive training from the full-time staff.*
- *Training is provide from local and national experts in: invention and design, free-choice learning, and diversity. Teachers are provided year round training and direct support.*
- *We do in house training's*
- *We provide in house training on mentoring, curriculum design, cognitive development and pedagogy.*
- *One week summer workshop*
- *We offer instruction to teachers periodically, and count on online resources for a great deal of educator support. We held a teacher training workshop in Medford last summer.*
- *Program specific professional development by Garmin engineers, ORTOP for legorobotics MOUSE by national provider, gardens by Oregon Dept. of Agriculture and other partners, NW Invention Center for STEM instructors*
- *STEM center*
- *Depends; could be help with curriculum, classroom management, youth safety, child development, etc.*
- *CS PD by Curriculum Developer*
- *Superquest*
- *On line*
- *Teachers and Staff offer hands on training to less seasoned staff and volunteers. We have also brought teachers to 21st CCLC conferences.*
- *Training in program philosophy, informal outreach, mandatory reporting.*
- *for the NASA curriculum , we have a staff member who went to Washington DC to learn the curriculum , but besides that no*
- *STEM - 2 hours every 9 weeks provided by school day teachers STEAM - 2 hours every 9 weeks provided by Oregon ASK Lego Robotics - 9 hours once a year for new coaches provided by ORTOP garden instructors are mentored by Planting Communities, LLC*

Table 19. Instructional Staff Background in STEM Fields

What percentage of instructional staff have a background, training or experience in the STEM fields?	Percent of Programs
0 to 25 percent of staff	46 %
25 to 50 percent of staff	14 %
50 to 75 percent of staff	11 %
75 to 100 percent of staff	29 %

Note. N = 56 organizations that offer afterschool STEM learning opportunities.

Table 20. Instructional Staff Interest in STEM Fields

What percentage of instructional staff have an expressed interest in the STEM fields?	Percent of Programs
0 to 25 percent of staff	25 %
25 to 50 percent of staff	18 %
50 to 75 percent of staff	12 %
75 to 100 percent of staff	45 %

Note. N = 56 organizations that offer afterschool STEM learning opportunities.

Table 21. Instructional Staff Participation in STEM Professional Development

How often do staff participate in STEM-related workshops and trainings?	Percent of Programs
Less than once a year	40 %
Once a year	35 %
4 times a year	19 %
6 times a year	4 %
Once a month	-
More than once a month	2 %

Note. N = 52 organizations that offer afterschool STEM learning opportunities.

Table 22. Professional Development Needs

What are your current professional development needs?	Percent
Staff training	69 %
Networking opportunities	64 %
Research on best practices	52 %
Technical assistance	38 %
Assistance on utilizing standards	38 %
Other (individual comments included the following: • *Abstracts of curricula available online or free from STEM providers.* • *Align with school day.* • *Funds to pay teachers to participate.* • *Getting the school to care, recognize, show an interest.* • *Materials.* • *Retaining qualified staff members.* • *Staffing.* • *We struggle finding competent science teachers to help us!*	13 %

Note. N = 61 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer

Partnerships

Eighty-two percent of responding organizations reported that partners were involved in their programs. The most frequently reported partner types as displayed in table 23 were business or corporate partners (48 percent), colleges or universities (39 percent), school-day STEM teachers (38 percent), and science centers or museums (33 percent).

Table 23. Types of Partners

Which of the following partners do you engage to offer your STEM programming?	Percent
Business or corporation	48 %
College or university	39 %
School STEM teachers	38 %
Science center or museum	33 %
Federal science agency (NASA, NIH, etc.)	8 %
Other *(comments included local and state government agencies, non-profit organizations, afterschool program providers, and school districts.)*	28 %

Note. N = 61 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer.

Table 24. Involvement of Partners

What do these partnerships provide?	Percent
Expertise	57 %
Volunteers	52 %
Materials	44 %
Curriculum	38 %
Advocacy	31 %
Funding	30 %
Training	26 %
Other -- individual comments included the following: • *Camp gear.* • *Data tracking, snacks.* • *Space to host camps.* • *They plan and present many of our STEM programs.* • *They provide teachers for our professional development program, too.*	8 %

Note. N = 61 organizations that offer afterschool STEM learning opportunities. Respondents were allowed to mark more than one answer.

Evaluation

Two thirds of programs that responded to this survey reported that they conduct evaluations of their STEM program (67 percent; N=61). Internal self-assessment studies were reported by 57 percent of programs; 20 percent had a designated staff member within the organization to conduct evaluation studies; 15 percent had an external evaluation conducted by an expert from an outside organization. Both quantitative and qualitative data collection methods were reported (by 36 percent and 54 percent of programs respectively.)

Among those programs that conduct evaluation, about two thirds reported that the evaluation research focused on attitudes and behaviors of students and 61 percent reported collection of attendance and demographic data. Fewer than half reported collection of data on knowledge, skills, academic achievement, or fidelity of program implementation. (see Table 25).

Table 25. Evaluation Foci

What is included in your evaluation?	Percent
Attitudes and behaviors (interest in STEM, intent to pursue career)	66 %
Attendance and service statistics (participation, demographics)	61 %
Knowledge of subject matter (demonstration of STEM skills, completion of STEM projects, academic achievement in STEM areas)	41 %
Fidelity of implementation (degree to which implemented consistently)	34 %
Other -- individual comments included the following: • *Interest in continuing to study science - evaluation of quality of our programs.* • *Program satisfaction.* • *Self efficacy, flexible mind set, pro-social skills.* • *A formal youth engineering certification program.*	10 %

Note. N = 41 organizations that offer afterschool STEM learning opportunities and report conducting evaluations of their programs. Respondents were allowed to mark more than one answer.

Among those programs that conduct evaluation, most (88 percent) reported using the evaluation findings to improve their programs. More than half reported using the findings in grant applications and reports to funders (see Table 26).

Table 26. Use of Evaluation Findings

What do you do with your evaluation results?	Percent
Use to improve program	88 %
Use in grant applications	58 %
Give to funders	51 %
Report to students' families	22 %
Nothing	2 %
Other -- individual comments included the following: • *Publish research.* • *Report to community and volunteers.*	5 %

Note. N = 41 organizations that offer afterschool STEM learning opportunities and report conducting evaluations of their programs. Respondents were allowed to mark more than one answer.

Among programs that do not conduct evaluation studies, reasons why they do not included:

- *Completes follow-up with participants and narrative reports. Has not conducted a full program evaluation.*
- *Do not have the staffing or time to conduct evaluations.*
- *Have not offered it as of current date.*
- *Haven't needed to.*
- *New program.*
- *No currently established evaluation criteria developed.*
- *No funds for this activity, although recognized as important. Some evaluation may be conducted on the materials provided from the national organization.*
- *Not well developed enough at this time.*
- *Scope of program*
- *Time and money. We evaluate the after school program overall not STEM specifically.*
- *We are in the beginning stages, we will in the coming months.*
- *We are just starting this program.*
- *We do an overall program evaluation because STEM curriculum is just one component that we offer during our daily schedule.*
- *We evaluate the overall program, but don't spend much time evaluating each individual activity within the program. Our site directors and recreation leaders do a quick what-worked & what-didn't for all activities in order to make tweaks next time, but nothing formal.*
- *We have not developed the program to that extent. We do evaluate based on attendance.*
- *We just haven't done it yet. We've only been doing our program for two years.*
- *We lack time, funding, and staff to spearhead such efforts. We try to offer what we can but with minimal resources it's hard to run a well-structured program.*
- *We will but haven't yet. It's also hard to know what to evaluate, and how to evaluate it. We keep track of attendance, but nothing more than that for STEM-specific activities.*