Visiting Naturalist in the Schools

2018 Program Evaluation

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SUMMARY

This report summarizes research conducted in 2018 to evaluate the *Visiting Naturalist in the Schools* program. Finding, based on surveys of participating teachers, naturalists, and volunteers and on teacher interviews, are provided with varying levels of detail, along with data from a preliminary pilot test of newly developed student surveys. Adult participants consistently report strongly positive views of the program design and components, the organization and management of program activities, and the perceived results for students, teachers, and schools. They believe the program both supports and extends the curriculum and instruction of Montana schools in important ways. These include successfully engaging students in developing their sense of place in Montana, their appreciation and study of nature, their skills and knowledge in the natural sciences, and their interdisciplinary integration of these topics with other academic subjects such as writing and the arts. Program naturalists and volunteers are seen as valuable educational partners for teachers, and as valuable role models for students. The program is well positioned for continued refinement and expansion as Montana science standards and school curricula are updated in response to the Next Generation Science Standards.

The mission of the Montana Natural History Center is "to promote and cultivate the appreciation, understanding, and stewardship of nature through education." The ***Visiting Naturalist in the Schools*** program serves this mission by providing elementary school students with a cumulative year-long sequence of classroom-based and outdoor activities. These activities use observation of nature along with scientific inquiry practices and written and artistic expression to develop student interest in the natural world and to build student knowledge and appreciation of local natural history and natural resources.

This report contains findings from program evaluation research conducted in 2018. The study did not use an experimental design – no comparison group was measured – instead, the findings are based on analysis of detailed responses from participating teachers, program naturalists, and program volunteers from Missoula and surrounding school districts. Surveys and interviews were carefully constructed and confidentially administered by an independent researcher in order to ensure that respondents would have many opportunities to offer observations or opinions about program weaknesses as well as strengths, and to suggest recommended improvements in the program.

A sample of students from one school also pilot-tested a new survey about their program experiences; their responses are integrated into the report as a supplement to the data from teachers, naturalists, and volunteers, but the student data should be considered preliminary and more tentative, given that the student survey is still in development and the student sample was limited.

A total of 43 teachers, 10 program naturalists, 26 program volunteers, and more than 100 students participated in the survey research. Each group answered similar sets of questions about key elements and goals of the VNS program, allowing analysis of the extent to which their different experiences and perspectives might (or might not) converge on similar judgments of program value, or similar perceptions of program outcomes. These survey instruments are now available for routine use in gathering feedback from program participants in future years. In addition, a random sample of eight teachers participated in interviews with the researcher, based on a consistent, structured interview protocol. In addition to continuing to refine the program based on this feedback, options are outlined below for continued development of research tools and designs for improved student outcome evaluation and for more complex formal evaluation research studies.

The summary below includes brief, general highlights from the research findings. In the full report, the final chapter on "Findings by Topic" follows the same general structure as this summary, but provides greater detail about how the responses from different groups were blended into an overall perspective on each topic of the research. Much more detail about the perspectives of each group (teachers, naturalists, volunteers, students), including a wealth of verbatim comments from individuals, is available in separate chapters covering each of these groups.

General Perspectives on the *Visiting Naturalist in the Schools* Program

Program Enjoyment. **Nearly all teachers, volunteers, program naturalists and students reported enjoying the program.** Many gave the highest possible ratings to the program or wrote detailed comments about their general appreciation for the program as a whole and for specific program activities.

Value of Program Components. **Participants value all aspects of the program.** Teachers, volunteers, program naturalists and students endorsed all three major activity formats — field trips, in-class lessons, and outdoor school yard activities. Educators valued the addition of inquiry, science learning and interdisciplinary study of local natural history to school curriculum, and the use of program naturalists and volunteers as additional role models for students. Student journals were endorsed by a majority of teachers and students, though not all teachers make use of these tools for student assessment or grading, and some students dislike the journaling.

Overall Program Value. **Teachers, students, volunteers, and program naturalists believe the program as a whole is well organized and facilitated, a valuable use of their time, and worth recommending to others.** Their views on the value of the program are evident in responses to specific rating-scale questions on these topics as well as in their free-response comments to specific and general questions about the program, which generated many "testimonials" to their positive experiences with the VNS program.

Program Impact on Students, Schools, and Educators. **Teachers, volunteers, and program naturalists offered almost unanimously positive views of program impact on students, schools, and educators.** Asked for their general views of the program, teachers, naturalists and volunteers were unanimous in reporting positive program effects on students, especially with regard to student engagement in nature and science; increased appreciation for the natural world and for approaching the world with the skills and attitudes of a naturalist; and increased knowledge, skills, and experience in science, observation, and inquiry. Teachers appreciated that the program provides opportunities for all students to participate and succeed; several were surprised that the program appeared to foster active and successful participation by particular students who were typically less interested, active or successful in school activities. Several volunteers reported surprise at how engaged students become in scientific observation and investigation of nature, and several commented about the level of knowledge and creative insights about nature that students exhibit and the amount of growth and learning that they observed in students over the course of the program year. Naturalists were surprised at how program effects extend into the community, and extend over time, through ongoing relationships, observations and discussions of natural phenomena involving students, teachers, naturalists, and their friends and family.

Teachers, naturalists and volunteers also reported positive program effects on schools and on themselves as educators. Themes included supporting and enhancing school science curriculum; connecting school science curriculum and instruction to the local community and natural world; extending school curriculum and learning activities beyond what would otherwise be available; increased opportunities for interdisciplinary learning that integrates, science, mathematics, language arts, and visual arts; improved educator content knowledge in science and natural history; improved teaching skills and connections with students; and enhanced ongoing curiosity and lifelong learning for adult educators.

Student Engagement in the Natural World

Youth come to school with an innate curiosity about the natural world. The VNS program is based on the premise that youth are inherently interested in nature, and this curiosity can be cultivated with inquiry-based scientific investigation of natural features of their local community. Teachers, volunteers, and naturalists strongly endorsed this premise as fitting with their observations of Montana students.

The VNS program builds on students' existing curiosity about the natural world. More specifically, teachers, naturalists and volunteers reported that the VNS program builds on students' existing curiosity about nature, helps extend their awareness and interests into new aspects of the natural world, and helps students learn to use scientific tools to explore and extend their engagement in nature. This perception held for students who already have a strong and positive history of experiences in nature as well as for students with limited or negative prior experiences in nature. Students reported that their engagement in nature after their participation in the VNS program was significantly greater than it had been before their participation in the program, including greater interest and curiosity in animals, plants, weather, and other parts of nature; more frequent observation of nature; more interest in learning how to use scientific tools to study nature; and more interest in taking classes or getting a job as a naturalist.

The VNS program supports the development of natural resource stewardship. Although many of the program naturalists and some teachers and volunteers expressed opinions that the program could do more to promote conservation and stewardship, most agreed that the program does help students develop connections and attachment to their local natural areas and appreciation of the importance of thoughtful management, conservation, and stewardship of natural resources. Students supported this view, reporting more interest in helping take care of animals, plants, and nature after participating in the program.

Student Engagement in the Sciences

The VNS program makes school science curriculum more engaging for students. Teachers and naturalists concurred that the Visiting Naturalist in the Schools program makes school science curriculum more interesting and accessible for students, and that the major components of the program (in-class lessons, school-yard activities, and field trips) each help to develop and strengthen student interest and engagement in the natural sciences.

(Usage note: throughout this report, "the sciences" are often referred to in plural form, to remind us that various scientific disciplines use very different methods in very different contexts, complexity that is too often obscured by science education approaches that seek to boil everything down to a generic, one-size-fits-all "scientific method.")

Relationships with VNS adult role models increase student interest in science. Teachers and naturalists also agreed that student interest in science is increased by their experiences and relationships with the visiting naturalists and program volunteers.

The VNS program increases student interest in further education and careers in science. Although several naturalists noted that these questions require long-term studies, the consensus perception among teachers, naturalists and students was that through their experiences in the VNS program, students become more aware of and interested in opportunities for further learning and careers in science. Students also reported that their engagement in the sciences after their participation in the VNS program was significantly greater than it had been before their participation in the program, including greater interest in learning more about science, greater curiosity to find out how scientists figure out how things work in nature, and greater interest in finding out how to take more classes or get a job as a scientist.

Student Learning in the Sciences

The VNS program enhances school science curriculum and supports student learning of science content and practices. All teachers and naturalists agreed that the VNS program greatly enhances school science curriculum, strengthens and supports student learning of natural science content, and helps students learn to use tools and practices of scientific investigation. Themes in their open-ended comments emphasized the value of linkages between VNS program content and school science curriculum and learning activities, ways that VNS extends learning beyond school curriculum, student observation skills and ability to focus attention on extended tasks, and the cumulative nature of what students learn about science through their year-long VNS program experience.

The VNS program builds student confidence with science content and practices. All teachers and naturalists also agreed that students become more confident with science topics and activities through their VNS experiences. Students reported that their confidence in doing scientific work after their participation in the VNS program was significantly greater than it had been before their participation in the program, including their ability to study nature the way scientists do and their ability to do the kind of work that scientists do.

Educator Learning in the Sciences

The VNS program enhances educator knowledge and confidence in science content, practices and curriculum. Teachers, volunteers, and naturalists reported that the VNS program enhances their connection with school science curriculum, their own learning of science content and practices, and their skill, knowledge and confidence as educators with science topics and activities.

School Capacity to Provide Engaging Science and Interdisciplinary Education

The VNS program enhances the capacity of schools to engage students in their science curriculum and in other disciplines. Teachers reported that the VNS program:

- Enhances their school's capacity to address Montana state standards in science education
- Enables their students to go deeper than they would otherwise go into science topics in the school curriculum
- Enhances their school's science curriculum with additional content beyond the topics they would otherwise be able to cover
- Enables their school to provide engaging science activities to students beyond the kinds of experiences they would otherwise be able to provide
- Provides students with access to a greater number and variety of science learning activities than they would otherwise have
- Provides students with additional experiences with science-oriented role models
- Enables teachers to learn more about science content and practices, and do a better job helping students learn about the sciences
- Offers students well-rounded, project-based, interdisciplinary activities in which they learn and apply many different academic subjects at once through real-life, authentic experiences.

Program Strengths, Weaknesses, and Recommendations

All major components of the program were viewed by teachers, naturalists, and volunteers as strengths, including engaging hands-on science, writing and art activities; field trips and other outdoor activities; consistency and organization over time of lessons and activities; and skilled and knowledgeable role models (the program naturalists and volunteers) and their relationships with students and teachers. In interviews, teachers commended the VNS program staff for communicating well with schools to prevent or solve logistics problems and to ensure a clear understanding of program requirements and expectations, as well as for being flexible and accommodating in scheduling activities. They emphasized the importance to many schools of scholarship support to mitigate tight school budgets, and noted that their administrators were supportive of the program.

In addition to having many opportunities to give low ratings to specific program components or on specific questions about the program, teachers, naturalists and volunteers were also asked to list the "least important or least effective parts of the VNS program," and to recommend changes to improve the program. Very few weaknesses or recommendations for change were nominated; these included recommendations to:

- work with schools to find more class time for the program, e.g. offer optional ways to expand the time devoted to the program, such as an option for longer class sessions, or programming for additional grade levels
- Encourage more teachers to be actively involved in their students' VNS activities
- Provide more "add-on" extensions to help teachers leverage the VNS lessons into additional units, lessons, activities, or interdisciplinary connections across the curriculum
- Continue refining the VNS lessons to update and expand the program's linkage to Montana science education standards, which have recently changed in response to the Next Generation Science Standards (NGSS)
- improve certain VNS lessons in specific ways detailed in the report

Volunteers reported great satisfaction with their role, especially the opportunity to build meaningful connections with students and naturalists and to increase their own natural history content knowledge; many affirmed that they recommend the VNS volunteer role to others.

When asked about their recommendations on three specific issues regarding program focus and priorities, teachers, naturalists and volunteers strongly supported views that:

- it is important and useful for students to have the same Visiting Naturalist all year, rather than different Visiting Naturalists throughout the year,
- having positive experiences to develop interest in nature, science and learning is more important for students than efficiently "covering" a lot of specific content from curriculum or standards, and
- outdoor activities are an essential, irreplaceable part of the VNS program.

The highlights presented in this summary are distilled from quantitative responses to rating scales as well as responses to open-ended survey and interview questions, all of which are presented in detail in the full report.

Recommendations for Further Program Evaluation Research

Some recommended options for continuing program evaluation research include:

- Further development of student surveys as a basis for ongoing program development and improvement and for potential use in more formal research designs for program evaluation. Another round of survey revision and pilot testing in Spring 2019 would be an efficient next step.
- Exploration of options for research study designs that could include an experimental or quasi-experimental comparison group. This would require appropriate logistical circumstances (primarily the availability of a participating comparison group) as well as funding considerations (e.g., dedicated research grant funding).
- An alternative (or additional) approach would be to convene and fund an advisory panel of experienced environmental educators and provide them with program materials, structured questions to address, and opportunities to observe program activities. The panel would then be charged with writing a report and recommendations based on their expert opinions and observations.