

Discover Nature Schools Evaluation Teacher Focus Groups:
A Look at Fidelity of Implementation

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Executive Summary

Fidelity of implementation (FOI) includes the extent to which a program is implemented as designed. We examined FOI for Discover Nature Schools (DNS), a pre-K-12 conservation education curriculum developed by Missouri Department of Conservation, using focus groups with teachers. We found that teachers liked the DNS program and were eager to share their thoughts and experiences related to DNS. Teachers at the focus groups indicated that they had different levels of implementation of DNS, with few saying they taught DNS “by the book.” Institutional barriers, alignment of DNS with district academic standards, outside support, and challenges teaching lessons outside affected FOI.

We make the following recommendations about the DNS program based on preliminary results of this study:

- Keep the DNS program and do not change it too much
- Understand that many, if not most, teachers may not use the DNS curriculum “cover-to-cover”
- Curriculum materials
 - Integrate technology into DNS
 - Align DNS with current academic standards
 - Revise *Conserving Missouri’s Aquatic Ecosystems* (grades 6-8) to eliminate some content and be aligned with current academic standards
 - Consider identifying which activities are appropriate for specific grade levels or describe how activities could be adapted for different grade levels
 - Determine if individual DNS activities are an appropriate length
 - Consider having alternate indoor activities, particularly for *Nature Unfolds* (grades K-2)
 - Understand that some teachers may not be comfortable with the *Nature Unfolds* student book because most of the “baby” turkeys die
 - Consider adding more supplemental teaching materials, particularly for *Nature Unbound* (grades 9-12)
 - Review pre- post-unit assessments and end of lesson quizzes
 - Consider adding a glossary to the student books that currently lack one
 - Provide curriculum materials in Spanish
 - Investigate ways to accommodate special education, disabled, and at-risk students
- Grants
 - Review how DNS field trip and supplies grants are administered
 - Review the field trip grant funding formula of \$7 per student, requirement of at least 10 students in a class, and 100 mile travel limit to make sure grant requirements are fair and equitable
 - Provide a list of vendors for supplies
- Training/support

- Provide an online mechanism for DNS teachers to communicate
- Review ways for teachers to increase their content knowledge
- Consider ways to limit time outside school hours for DNS trainings
- Investigate ways to keep EC response times appropriate

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Introduction

The Discover Nature Schools (DNS) conservation education program is a free K-12 curriculum developed by the Missouri Department of Conservation (MDC). DNS was developed and implemented to simultaneously teach current academic standards and enhance student knowledge and understanding of conservation issues in Missouri. DNS features Missouri species, local habitats, and aims to connect students with nature by engaging them in learning experiences outdoors. Long-term goals of the DNS program include students participating in outdoor activities, valuing the forest, fish, and wildlife resources of the state, increasing awareness of MDC, and taking actions that promote healthy resources and their conservation. The first unit, *Conserving Missouri's Aquatic Ecosystems*, for middle school students, was implemented in 2006. The DNS program now includes units for preschool through high school. DNS units were designed to be aligned with Grade Level Expectations (GLEs)(Missouri Department of Elementary and Secondary Education, n.d.). However, Missouri has since adopted Common Core standards for math and language arts (Common Core State Standards Initiative, 2014). Also, Missouri may adopt the Next Generation Science Standards (NGSS)(Achieve Inc., 2013).

As of January 2015, there were 1,236 Missouri schools in 467 districts with at least one DNS classroom. This participation includes 40% of public and private schools and 89% of districts. MDC offers free teacher trainings for each of the five units. Teachers who participate in the trainings are eligible to apply for MDC grants for field experiences, outdoor exploration equipment, and outdoor classroom materials.

The aim of formative evaluation is to improve a program (Scriven, 1991). DNS units were piloted in the classroom, evaluated, and revised prior to being implemented. MDC has also been collecting ongoing information to improve DNS, and there are indications that DNS is positively impacting student learning as scores on pre- and post-unit assessments increased on average by 25% during the 2013-14 school year. Also, during the last four school years, over a third of teachers reported a decrease in student behavior issues on the days they taught DNS. However, until now, there has not been a comprehensive summative evaluation (Scriven, 1991) to determine the efficacy or effectiveness of DNS. We began a three-year evaluation of DNS in July 2013. We began the study by examining the fidelity of implementation (FOI) of DNS.

Fidelity of implementation

FOI is “the extent to which delivery of an intervention adheres to the protocol or program model originally developed” (Mowbray, Holter, Teague, & Bybee, 2003, p. 315). There is a recognition that FOI should be considered when implementing educational interventions (McDonald, Keesler, Kauffman, & Schneider, 2006). Conservation education programs are often optional (i.e., not part of the official curriculum) and may often be used in addition to existing curricula. Also, program developers may have little control over how such programs are implemented in classrooms, with many differences in implementation due to preferences of

individual teachers and administrators, differences in curriculum standards between districts, etc. Therefore, there may be wide differences in implementation across the program.

Century et al. (2010) developed a conceptual framework of FOI. Their framework includes two categories: “structural critical components” and “instructional critical components.” Structural critical components are “the developers’ intentions about the design and organization of the intervention itself,” while instructional critical components are “the developers’ intentions about the participants’ ... behaviors and interactions as they enact the intervention” (Century et al., 2010, pp. 204, 205). Structural critical components contain two subcategories: “procedural critical components,” which are “the organizing elements of the intervention that communicate to the user in the simplest sense, *what to do*,” and “educative critical components,” which are “the developers’ expectations for what the user needs to *know*” (Century et al., 2010, p. 205). Instructional critical components also have two subcategories: “pedagogical critical components,” which are “the actions, behaviors, and interactions that the user is expected to engage in when enacting the intervention,” and “student engagement critical components,” which are “the actions, behaviors, and interactions the recipient is expected to engage in when participating in the enactment of the intervention” (Century et al., 2010, p. 205).

Central question

We determined the intended FOI for DNS based on input from MDC administrators and staff and teachers who participated in the DNS program. Intended FOI for DNS included: teaching lessons in sequence, teaching all or most lessons, teaching all or most lessons outdoors, and coordinating field experiences with DNS curriculum (K. Lohraff, personal communication, February 20, 2014). Although this is part of a larger evaluation study with three central questions, for this report, we are attempting to answer the following central question and sub questions, which were developed with input from DNS stakeholders:

What is the fidelity of implementation of the DNS program?

- a. *How do teachers adapt DNS for their own classrooms?*
- b. *Are teachers using all the lessons in each DNS unit?*
- c. *What barriers do teachers have when teaching DNS?*
- d. *Do teachers have sufficient support within their schools and by MDC to effectively teach DNS? If not, what kinds of additional support do they need?*

This portion of the study is primarily focused on structural critical components (procedural: sub questions a and b) (educative: sub questions c and d) of FOI (Century et al., 2010). Although they not are included in this report, later portions of the study will examine instructional critical components more fully.

Methods

Case study approach

We are using a case study approach to explore DNS program FOI (Yin, 2009). We have chosen a single “case” design (Yin, 2009), with the case being the overall DNS program. While the larger DNS evaluation study will employ a variety of qualitative and quantitative techniques, this report deals with focus groups of teachers who taught students using the DNS program.

Sampling/data collection/data analysis

In an effort to talk with teachers in rural and urban schools in different regions of Missouri, we held focus group meetings in March, 2014 in Kansas City, Kirksville, Kirkwood (St. Louis), and Springfield. St. Louis, Kansas City, and Springfield are the three largest metropolitan areas in Missouri. MDC Education Consultants provided lists of teachers in these areas who had taught DNS. We recruited teachers by email. We sent a confirmation email with a request to complete an online survey on background and teaching to teachers who agreed to participate. Initially, we targeted teachers in urban schools for the Kirkwood group, suburban schools for the Kansas City group, and rural schools for the Kirksville and Springfield groups. However, we were unable to recruit sufficient numbers of participants using this strategy. Therefore, we also sent invitations to teachers in urban schools for the Kansas City and Springfield groups. We paid participating teachers \$100 to encourage participation and to compensate participants for their time and travel.

During the focus groups, we asked 10 questions, including questions about benefits of using DNS, challenges of using DNS, how DNS is adapted by teachers, and suggestions for improving DNS (Appendix A). Some questions were adapted from Krueger (1998). We made digital audio recordings of each meeting. We transcribed all interviews, reading through both transcripts and recorded notes to get an overall sense of the data (Creswell, 2013). We read through the transcripts a second time and began categorizing the data by examining which comments fit together (convergence) and which did not fit together (divergence) (Merriam, 1988). We coded the data based on the categories, and were constantly updating categories based on new data. We then examined the categories, tried to combine or eliminate categories that were not mutually exclusive, and examined uncoded portions of the transcripts to see if we needed new categories. As we were coding the data, we realized a logical way to combine categories into themes would be to use Century et al.'s (2010) FOI framework as a guide. We analyzed the data using NVivo 10 (QSR International, 2014).

Results

There were a total of 31 teachers (26 women, 5 men) who attended the focus group meetings in Kansas City (n=6), Kirksville (n=4), Kirkwood (n=11), and Springfield (n=10). There were teachers from kindergarten through twelfth grade. Some of the teachers already knew other teachers at their meetings. After some initial stiffness, there was pretty good “chemistry” in the groups, with quite a bit of laughter, especially in the Kansas City and Kirkwood groups. Most teachers were eager to share and would sometimes talk over each other, especially in the larger Springfield and Kirkwood groups. They would also respond or ask

questions about comments that other teachers made. The Kirksville meeting, with only four participants, took less time (about an hour and a half) than the other meetings (about two hours).

There were 37 responses to the online questionnaire for teachers who agreed to participate in the focus groups. Most teachers (n=26) reported having taught at least 11 years and nearly all (n=35) taught science. Nine teachers had taught DNS during only the current school year, and 12 teachers had taught DNS for at least four years. Most teachers said they were somewhat comfortable (n=11) or very comfortable (n=20) about teaching lessons outdoors.

We present the results below using themes from Century et al.'s (2010) framework: structural critical components (procedural and educative) first and instructional critical components (pedagogical and student engagement) second (Table 1).

Procedural critical components: Importance of DNS program

Most of the results fit under procedural critical components of FOI. Teachers spoke about how important they thought the DNS program was:

...it's super that it's...[the DNS program] here and people taking the time and interest in it...[I'm] also very grateful, but, if you're looking at what can we improve, you know, I can see some things it'd be wonderful if we could. But that doesn't mean it's not a good program.

When asked what was most important for MDC to know about DNS one teacher said to "Keep the program." In fact, several teachers were concerned that the reason for the focus groups might be to get rid of the DNS program:

...one of my reasons for being here, for real, the thought of the hundred dollars was nice, the other reason I was here was to fight for, cause I'm like, if they're doing a focus group, that means somebody's talking about let's cut this arm off. And I'm here to say this arm needs to stay [laughter].

Procedural critical components: DNS curriculum materials

There was a lot of discussion about how teachers used the DNS curriculum materials. Overall, teachers seemed to like the DNS curriculum materials:

I'd give it an "A" just because, I mean, the experience I've had with it has been very rich, um, and again, coming from a non-science teacher, it was teachable for me. I mean, non-science background. I am a science teacher now, but, you know, um, it was accessible, user friendly, you know, at the right level for my kids. So, for me it was good.

Teachers liked the production quality of the printed materials, although they mentioned the middle school unit (grades 6-8), *Conserving Missouri's Aquatic Ecosystems (CMAE)*, could use an update as the clothing worn in some of the pictures was from circa 1991. One teacher thought that pictures in *Nature Unleashed*, the grades 3-5 unit, were "cartoony" and wanted more

“real life pictures.” One teacher mentioned that a graph (Figure 8-3) in *Nature Unbound*, the high school unit (grades 9-12), had animal categories on the y-axis and number of species on the x-axis, while the “End of Course [Exam] doesn’t do it that way, and if they [students] do do it that way, it’s wrong.” Some teachers thought the *CMAE* unit had some drawbacks, particularly in the way it was written: “It’s just very textbooky, which is great, but, my kids don’t need another textbook, they need, you know, real life reading and experiences, um, so I was quite jealous of the, of the fifth grade book.” There was also discussion about the amount of content in the *CMAE* unit:

It’s overwhelming the amount of content in the chapters. Not that I don’t think it should be there, I just think when you, when you have three columns on a page, and you’ve got three or four different subtitles [laughter] with heavy content. It’s like, uh, what are we focusing on here? Are we trying to figure out? It just feels like a lot of stuff.

One teacher said the student book for the K-2 unit, *Nature Unfolds*, is:

really depressing for kindergartners, because there are four little baby turkeys that hatch out, and like, all but one dies. And we know how each and every one dies. And I went to go try to read the book to the kindergartners, and I’m like, ‘This is depressing.’ ...One’s eaten by a fox, it’s dead. And I think another one might have starved or something... Oh, another one does get shot by a hunter. That’s a little much for kindergartners, so, possibly might want to relook at that book in the future. It’s a little bit too down town to reality for them.

One teacher mentioned “gaps,” including not covering fossils, in *Nature Unleashed* “that don’t meet all of the fifth grade curriculum.” Teachers at one of the meetings wanted safety information, especially about poison ivy, as part of the curriculum. At this same meeting there was discussion about whether or not the student books should have glossaries. One teacher wanted a glossary in *Nature Unleashed*, “There’s no glossary in the back. You know, and that’s a key skill for third, fourth, and fifth grade – to look up the definition in the back.” However, some other teachers did not want a glossary in *Nature Unbound*: “See I have some of the opposite issues with my high school students: ‘Why should I read the book when I can open up the back in the glossary [agreement by other teachers] and find out what, you know?’” This same teacher was, however, in favor of having an index in *Nature Unbound*. Another high school teacher suggested making “the glossary perforated so that people that don’t like it could rip it out [laughter], but I can still have it in there. I see my kids in the glossary and I’m like, ‘thank God.’”

Teachers also discussed the appropriateness of the DNS curricula for various grade levels, especially because each unit was designed for multiple grades:

I think it was great curriculum and it aimed for...the best – the expectations for the best of a range of grades. So if you’re talking sixth, seventh, eighth grade, that

pretty big range as it is. And if you're aiming for the best of eighth grade, well your typical sixth grader isn't gonna do very well. And same thing with Nature Unleashed, so.

Some teachers said they had challenges teaching DNS when students had been taught the curriculum in lower grades. Some teachers recommended reorganizing the lessons for individual grade levels based on Grade Level Expectations (GLEs), indicating which lessons are appropriate for which grade levels, or breaking *Nature Unfolds* and *Nature Unleashed* into three units covering two grade levels each. The *CMAE* unit can apparently be difficult reading, even for eighth graders, and *Nature Unfolds* has a workbook that is “kind of hard.” As one teacher put it: “They [second graders] can't do the writing part of it. They can do some sketches and etches. But the writing part... So I can only imagine what your kindergarten stuff would look like.” Some teachers said that it can be challenging figuring out which parts of the *CMAE* curriculum to use with different grade levels:

...with Missouri Aquatic Ecosystem and the varying ages, I'd love to see them scale it, so that you could say sixth graders can do this, eight graders I'd do this. I would love to see some leveling within the program.... Well they had it in sixth grade, they had it in seventh, which is part of the reason why I do the pond instead that year, and, you know, try to vary it that way and stretch out. But, um, I think we need just different levels of material for those different ages.

Some teachers talked about their challenges adopting the curricula for English as a Second Language (ESL) students: “I think the biggest challenges for us is first that we have to translate everything, because it's in English, and we have to teach it in Spanish. For us, it's a lot of work, but we knew it would be, because sometimes we have to translate other stuff that is trash [laughter].” Teachers suggested having Spanish language DNS materials available, including a “book on CD.”

Teachers discussed using the curriculum with special education, disabled, and at-risk students. One teacher wished, “that some of the activities, and the field trip could be potentially more handicap accessible. Uh, we have, you know some students that are wheelchair bound or, you know, various handicapped, um, issues and it would be nice if they could have some options.” This same teacher wanted an audio version of the student book on a CD for students who cannot read. One teacher talked about successfully adapting the curriculum for developmentally disabled students with the help of MDC education consultants:

We have some kids that are, um, severely, um, disabled. And so, they may not be, um, engaged with the material in the same way kids in my classroom would be. But, in my building, those teachers are still a part of it, and they still interact with my students if we're just, um, observing animals in nature. The good bird feeders or whatever. And then we can still use those materials in a different way. So a lot have been adapted for, um, MAP A students in my building because the teachers

found it very useful for their kids. And the, uh, education consultants have been very helpful with that process as well. So, um, that's been really good for us.

Many teachers mentioned wanting more of an integration of technology in the DNS curricula. Specific suggestions included having DNS “apps” that helped with field identification of tree or animal species, particularly aquatic invertebrates; interactive vocabulary practice; supplemental multimedia online material (e.g., videos of bear snaring); virtual field trips; wildlife webcams; integrating existing apps, such as Aurasma; links to articles in *Missouri Conservationist* magazine; games (could be a smart board game) for students to practice identifying fish or other animals, learn about food chains, etc.:

I know a long time ago Missouri Conservation used to have a, have a computer game that reinforced ecology. It was such a great game...I know that it's supposed to be a hands on program, but, the kids then are so technologically oriented. So, it'd kind of be nice to have a computer game or something that reinforced whatever you learned. Like, thirteen striped chipmunk, or squirrel and stuff, that they actually have some kind of interactive technology that they could do at night that kind of maybe said, wow, this is what we did...I know the whole purpose is to go out and do it nature, with nature. But that follow-up would be nice too.

Several teachers emphasized that student apps should use a game format: “Yeah, it has to be a game format, it can't be just, you know.” “Like not a flash card scenario.” “Their brains don't work like that [laughter].” Teachers appreciated that the written curriculum materials were available as PDFs online, but several would prefer having them in a format (e.g., Microsoft Word), that they could customize for their own classrooms.

There was quite a bit of discussion about materials to supplement the DNS curricula. Several teachers mentioned liking the DNS games, videos, and supplemental print resources. Although some teachers found the DNS student notebooks “to be really helpful,” several other teachers mentioned having “boxes” of unused DNS student notebooks because their students already have composition notebooks, and they suggested making the DNS student notebooks optional. A couple of secondary teachers wanted more supplemental teacher materials:

I love the, the resources that we have. But I feel like, compared to like what I get from like the, the national level...there's ExamView, there's online study guides, online tests, online quizzes, online flashcards. I've got a whole cardboard box full of like note taking, quizzes, all this stuff...I just feel like there could be more like teacher support materials...And I really feel like we've got a great book that's aligned to the standards, we've got good activities – more than I can fit in. Um, but we're missing some like the review, like, like note taking...Like for me if, I would like to switch over fully – like I teach my ecology unit out of Nature Unbound for the EOC. But I would have to supplement my lessons from, from other materials I've already purchased elsewhere because it just is nonexistent.

One teacher wanted to have kits, such as sample skulls, to borrow that complemented the units; however, another teacher pointed out that such trunks do exist and are available from MDC. One teacher thought a video clip on a DNS DVD that showed hunting was not appropriate:

There's one video clip where they bring out a gun and start shooting at stuff, and I wished I would have had a warning [laughter]. I guess, rural Missouri, maybe hunting is a bigger thing, but I thought it was showing a video clip on goose migration...And all of a sudden they start shooting...And they [the students] were just laughing and some of the girls were upset. And, I don't know, I didn't think it was appropriate. But, maybe in southern Missouri or something, I don't know...I'm not a hunter.

High school teachers were generally pleased with the pre- and post-unit assessment that is part of the *Nature Unbound* unit, although one teacher wanted more within lesson assessments, such as quizzes, for *Nature Unbound* and *CMAE*. Some teachers thought the pre- and post-unit tests were too long and asked questions that were too specific: “Like I don’t really care if they know all of the fishes [laughter]...there’s two questions about what type of fish would you feed minnows to. And you’re like, I don’t know, one that will eat it [laughter].” One teacher questioned the validity of using a test that covered the entire unit when a teacher may not have covered all the lessons. Some teachers thought the assessments were not formatted well and could be “overwhelming” to students:

I would say they're [the end of lesson quizzes] not very kid friendly [agreement]. They're teeny tiny print and some of our kids are still writing very large, and there's, I mean, we've just taken some and just retyped them on the computer and made them in much more kid friendly...

And the font on the tests. And the directions. They don't do well with one question that has eight tasks. That one is horrible, that one on the back about the which one [linked?] to food chain is its' name [question 17 in Nature Unleashed pre- and post-unit assessment]. Gives them a tiny – decomposers, herbivores, carnivore. I mean, and so, they're like do I put one, do you put? They cannot squeeze all of that into that little thing.

Several teachers thought the pre- and post-unit assessments focused on “rote memory” instead of “being able to apply the knowledge” (there was a lot of discussion in one group about students having to know about the pink katydid), although a high school teacher was, “actually impressed that it [the *Nature Unbound* assessment] wasn’t all rote memorization.” Some teachers thought, “an online test would also be less intimidating than a packet of 17 pages.”

One teacher thought the *Nature Unleashed* pre- and post-unit tests were appropriate for fifth graders, although the end of lesson quizzes, “vary a lot in their complexity. One chapter it takes them five minutes, and then the next one it will be a full hour for the test.” Several teachers said that they gave “open-note assessments” because in the DNS assessments, “it’s memorize

and spit out,” instead of using “higher-level thinking... So that’s why I let them use their notes, because it’s pretty much, did you read it? It’s in the book.” Another teacher intensively prepares students for the pre- and post-unit test:

We’re open book on everything but the test. But we did the study guide and we do a, I mean we spend a lot of time reviewing, and I have to just blatantly say: ‘You need to know this animal. It’s on the test.’ So, um, yeah, some of the questions are not, um, not written well for little kids. They’re not gonna memorize the animals.

Procedural critical components: DNS grants

There was much discussion about the grants that MDC provides for field trips and supplies. In fact, some teachers said that grant money was the main reason for their initial interest in the DNS program. Teachers appreciated the grants, saying the field experiences would not be possible without MDC funding: “...there is no more money from my district for field trips. And there is less money available, in general, for grants outside. So, this is a huge deal.” However, teachers also brought up some challenges. Getting \$7 per student for field experiences was a challenge, particularly for teachers from small districts: “...we have two, just two fourth grades – small class sizes. So, the money for the bus, we can only be gone a few hours... So, if it was more, if it wasn’t just based on number of kids, it would be better, because it’s very restricting.” One teacher in a rural area was concerned about the requirements of having at least 10 students in a class and traveling within a 100-mile radius to qualify for field experience grants.

Teachers also had challenges with the way the DNS grants are administered. Teachers wanted guidance, such as a source list, about which supplies to order and which vendors gave the best deals; however, others had such a list provided by their EC. A few teachers wanted materials provided directly by MDC, but others liked the flexibility of ordering their own supplies. Several teachers wanted money after the first year to replenish supplies or buy new ones once they got a feel for what they needed: “Do we really need 20 fishing poles, can we get by with 10? OK, ten’s a nightmare, now we really want 20, you know. I just don’t think you know until you’ve gone through it a couple of times.” One teacher suggested being able to purchase classroom supplies with surplus money from field experience grants. Teachers found it challenging that only half of the grant funds were provided up front and half at the end of the grant period: “I think, you know, a thousand dollars, but we only get 500 of it up front. So my school’s like, where’s the other 500 dollars?” “Yeah, so was mine. My secretaries were not happy about that.” “Yeah, I’m like, can we take this out of the science club budget? Uh, no that’s just the science club budget.” Some teachers said they had to use their own personal money to buy supplies and wait to get reimbursed by MDC: “I have to pay that out-of-pocket [mumbling]. I don’t have a choice. It’s either that or we don’t get to use the program.” One teacher said that it was difficult for her to meet the grant requirements because of teaching science to all grade levels and seeing students once a week.

Procedural critical components: Field experiences

There was a lot of discussion about DNS field experiences, with several teachers saying field experiences were the highlight of the DNS program:

But, my kids really enjoy the field experience, um, we go fishing...and I get such a positive response from the parents...And so, just seeing the student being able to spend time with, with them, with their parents, and seeing those kids that don't typically think that they enjoy science really enjoying it...so much of the curriculum is hands on, and they're able to really, truly, get dirty. Um, kids that didn't think that they liked science love when we do the, the DNS program.

“...the field experience was probably what I thought was the best, was being able to go on a field trip after you've taught DNS.”

The logistics of the field experiences were a challenge for some teachers, and some thought that field trips were a deterrent to some teachers using DNS:

...to organize something that's not paper and pencil...it takes a lot of work and you've gotta go...outside, and you've gotta arrange for the bus. And you've gotta take the kids and you've gotta make sure they've all got the right shoes and socks on. And you've gotta get dirty, and you've gotta get wet. And you've gotta touch a fish. Um, and there's a lot of people that are, you know, that are not known as the outdoor person, and they don't want to do it.

Teachers said that it took a lot of effort to recruit and train volunteers, scout field experience locations, and figure out where and when students should go. Also, scheduling field experiences was a challenge because so many other schools planned field experiences in the spring that popular field experience sites booked up early.

Procedural critical components: Support

Teachers reported widely different levels of support for the DNS program by their districts. Some school administrators encouraged participation in the DNS program: “...our superintendent knows [education consultant], has gone through the training before, and every principal I've had (we've had a lot of turnover lately), they all think it's great, so. Um, you know, we get a lot of support.” Some teachers said that their administrators enthusiastically participated in DNS field experiences: “every year I've had an administrator that goes on the field trip with me, and they see it. And they're like, this is the best thing *ever*. So they're, you know, they're all supportive.” Some teachers said that they had support within their districts to teach DNS as long as their students had acceptable standardized test scores:

In my classes, they blow it out of the water, especially the ecology section. And the principals love it, so my little rewards are a field trip to take 'em on a hike to [mumbling] outdoor area. When they start blowing the MAP test, the End of Course test, then we'll talk, I'm sure. But right now, they're, they're doing well and I attribute a lot of it to this book [Nature Unbound].

A teacher recounted her district paying teachers to encourage their attendance at a DNS training during the summer. However, a teacher at a parochial school felt isolated teaching DNS:

...I'm like the only one that teaches it in my school building...there might be a few other ones in the diocese, but I don't know who they are or whether or not they're teaching. And so, it's very much just on my own- kind of me and wherever, whoever I get in contact with through [MDC], so.

Teachers thought that education consultants generally provided good support for the DNS program: "...but I think a big benefit was having my Nature Schools, um, my [EC] and having, you know, person be there on that, that field experience day to kind of..." "Oh yeah. Oh my gosh, I couldn't have done it without them." "And so, the educational consultants are just a wealth of information, um, and a benefit, I mean that, they're definitely a big part of the program as well." However, some teachers thought they had to wait too long for a response when they contacted an EC: "When they were able to get back it was sufficient advice, but there would be sometimes two weeks in between a return of contact." And several teachers wished that their EC could be at field experiences to help with running student activities.

There was discussion during one focus group meeting about how during field experiences, teachers relied on help from parent volunteers. Some teachers said that they had enthusiastic support from parents:

Oh, I do have parents, especially dads that don't come to anything else [laughter]. Or granddad or uncle or big brother or somebody. So I usually have, they just kind of pop up, can I come? And it, and that makes it easier with an annual event, is that the younger kids have heard when they get into that higher grade, they get to go fishing. So, then that does help.

However, some teachers lamented that they could use more help from parents.

Procedural critical components: Time for DNS

Teachers agreed that DNS lessons, particularly field experiences, took longer to prepare than regular science lessons: "They are such great lessons, but you're right, they take a lot of time to prepare. And think that people aren't looking to...I think it's being seen as it's one more thing. Not, it could be *the thing*." However, several teachers said that being able to reuse materials from year to year cut down on preparation time after the first year. Some teachers said that DNS did more to promote student inquiry than traditional lessons:

...it's so much easier to take a classroom of 30 and say, read chapter 2, answer the questions on the worksheet. And I'm going to sit back here and...but they're not learning. And that's not what this program is designed to do. This program is designed to make this, create this. It's that inquiry base that is great. And so it takes time, but it's time well spent.

Teachers said they had difficulty fitting DNS into their existing school curricula: “For me, I would say it’s time, because my curriculum is so full, which I know everybody’s is, but that’s only one small tiny piece of my whole curriculum. So, a lot of times it’s pick and choose what you can to get it all in.” Although a high school teacher said that the DNS activities were an appropriate length, some teachers said that the individual lessons took longer than a class period and, especially with larger classes, took longer than indicated in the Teacher Guide:

Well, then I can ask this: whoever writes the lessons, if they’re not a classroom teacher, if they wrote a 20 minute lesson, it’s probably gonna take us 30 minutes to 40 minutes. So when they think about writing the lesson, if they’re writing a lesson and they say 30 minutes, it’s probably gonna take 45 minutes.

Teachers also mentioned having difficulty finding an appropriate time within the school year to teach DNS:

I also kind of find it challenging to figure out when to teach it. I’ve tried teaching it first thing in the fall. And then, but then you run into the hassle of trying to set up a field trip experience right away, and there’s a lot of other things that we’re doing at that time, with other field trips that we’re already doing. So then I’m like, well maybe I’ll wait till spring, and then I throw like a Jefferson City field trip in there or something else, or try to do it in early spring and then the weather doesn’t cooperate because it is a lot of outdoors, hands on so. Still haven’t figured out when is the best time to teach.

Procedural critical components: Teaching outside

Teachers said they enjoyed being outside in general: “I’m pretty much raised in the city, but I like being, I love being outdoors. I love being outdoors. And, I love being outdoors because I know all the things, different things that you can do.” They also said they enjoyed teaching DNS outside, although weather could be a challenge:

I try to go out for as many [lessons] as we can. I mean, obviously if it’s too cold and it’s not going to work then we stay in and do the lesson, but even the ones where it’s not necessarily required to go outside, like looking at the ecosystem poster and figuring out what kind of, what kind of animals are in there. We’ve gone outside to our little courtyard area and done that just to get outside, because the kids will come to class when we were doing this unit and ask, are we going outside today? And, I mean, how can you say no [laughter]?

Teachers mentioned that the winter activities in *Nature Unfolds* were challenging because “we rarely get snow in Missouri” and, due to school policy, “I can’t take the kids outside if it’s below 32 degrees.” Some teachers said that it was a challenge to find a suitable outdoor location near their school to teach DNS. Although some teachers said that they had problems managing

students outside (“I’m constantly plagued by just, herding cats [laughter]”), others said that teaching outside helped their students with behavior problems to focus:

At times, I mean they’re still going to be running around, sometimes. But, it, it just seems that, um, you know, they’re more focused. Even, even though it’s, you’re outside and there’s so many other things that would take their attention, you would think. You know, they like being outside and they just enjoy, you know, learning things about nature.

A couple teachers commented that the *Nature Unleashed* unit seemed to have more opportunities for going outside than the *CMAE* unit.

Procedural critical components: Extent curriculum components are taught

Except for one high school teacher, no teachers at the focus groups said they taught the entire DNS curriculum as written, although one was planning to and another said they have in the past: “I’ve done *Nature Unleashed* and *Aquatic Ecosystems*. But it...takes a long time. So that’s why, after I did it once, I was like, OK, I don’t know if I’ll ever be able to do this again...” Teachers mentioned picking and choosing curriculum components to match curriculum standards for their districts: “...I don’t teach the entire, um, curriculum, just because it doesn’t match and I don’t have...extra time in, in our year...to add on. And so I have to pick and...choose for things.” Some teachers said they combined several lessons into one “just to get through it. Because there’s other things you have to cover in science.” Some teachers mentioned supplementing the DNS curriculum with other activities from other sources, such as *Project WET*:

I kind of use it [the DNS curriculum], and fill in, even though there’s tons of information in there, you can also pull in other things to use with it, and carry it out so you can do more objectives. Because...our science books are dead, I mean they’re dead. And so they are not very helpful, so you can pull things that you can put, and piece it together, and it looks like it’s part of the program, but it’s actually also, you know, hitting these GLEs that were not covered, so.

Teachers at the focus groups talked about why other teachers they knew did not teach the DNS curriculum. Not having time to teach DNS or prepare DNS lessons was a common refrain: “And well, again, it’s one more program to add on to what we’re already trying to teach, and so, unfortunately, most of the other teachers are like no, I just don’t have time for it, so.” Another barrier was not having time to attend trainings outside school hours on how to use DNS: “So, you have limited amount of teachers willing to do after school [trainings]. But if there’s some way that they could push this to...workdays during the day. A PD day. We might get more teachers involved.” Some teachers said that if DNS was taught at one grade level in their buildings, then teachers at other grade levels could not teach it:

But what happened in one of the schools is, um, a teacher at a lower grade level did the Nature Unleashed program in their building. So, the money, the grant

money that they got to buy materials all went to buy materials that were used to augment a different grade level in fourth grade. So you can only get one. So even though I could go and say, oh my gosh this program's really good, you should try it out, it was too late, because they were already using it in another grade level.

There was also discussion about how some teachers don't teach DNS because they aren't comfortable teaching outside:

...some of the teachers, they're afraid to go outside with kids because they're afraid they're going to have behavior problems. I personally have just the opposite – the one's that I have trouble with indoors, when you go outside, they will do anything you say. Because they want to be out there in that hands on, you know, that kinesthetic experience...And with new teachers, you always assume that you're going to be able to get somebody, and it's the same...fear. I don't know if it's the lack of experience, the lack of what it is, but it's that same fear keeps coming through. And, it's really surprising how many constantly just don't want to take the kids outside. They don't even want to go out for recess...

Educative critical components: Alignment with academic standards

Teachers discussed topics that fit under educative critical components. It was important to teachers that the DNS curriculum was aligned with academic standards. Several teachers said that they were held accountable for their students' performance on Missouri Assessment Program (MAP) tests, and their students generally performed well on MAP tests. Teachers generally thought that the curriculum was aligned with Course Level Expectations (CLEs) and Grade Level Expectations (GLEs)(Missouri Department of Elementary and Secondary Education, n.d.):

Well, in fourth grade, the text materials and the objectives and the activities in the teacher's manual, um, it's as if somebody sat down with the 4th grade, um, Missouri GLEs, and, and wrote it. I mean, the match is...it's just like...a, glove.

A high school teacher said of *Nature Unbound*: “this was so well written that it goes along with the CLEs perfectly. Otherwise, I wouldn't have even considered it, because we live and die by the CLEs. I don't live and die, our district lives and dies [laughter].”

There was less agreement with how well DNS is aligned with Common Core standards (Common Core State Standards Initiative, 2014), with some teachers saying that Common Core stresses nonfiction reading, and DNS is “nonfiction. And so it's perfect for that.” Although one teacher said:

It's gonna need some more nonfiction reading passages to meet the Common Core Standards. I mean, like, not just the text, but like separate reading material. And just incorporating more technology will be – to go along with that too.

Other teachers pointed out that Common Core is pushing some expectations to earlier grade levels: “It’s shifting stuff around. They’re expecting our students to know more at lower...Kindergarten; you can’t just know your colors – red, white, and blue. You have to be able to write a letter when you’re in Kindergarten now.”

Even though Missouri has not adopted Next Generation Science Standards (NGSS)(Achieve Inc., 2013), several teachers said that their districts were adopting NGSS. Teachers said that DNS is not well aligned with NGSS and, similar to Common Core, expectations were being pushed to lower grade levels. Some said that *CMAE* in particular does not align well with NGSS:

I know that the Next Generation standards for sixth grade don’t include anything on, um, water conservation or the quality of water. Um, you know, the current standards that we’re using don’t have anything on water conservation or the quality of water. Um, we have a small ecosystems unit that is going to be slightly larger, but it’s not specific to Missouri.

Teachers agreed that DNS needed to be updated to stay relevant:

There’s a big push in our district to not be doing things just because they’re fun and you want to do them, but they really have to match perfectly. And so that’s one of my fears, is that, I love this program and they’re going to take it away because it’s not going to meet another expectation.

A teacher recommended having sections of *Nature Unleashed* for specific grade levels:

I’m committed to this program, and, and I would just, uh, be very sad if I had to give it up because of the Next Generation Standards, because the grade I teach. So, most important to me would be for them to break it apart, even for the three through five, so that we all could have a piece of this. A third, a section just for third grade, fourth grade, fifth grade. You know, so it, um, so it can stay in fourth grade.

Educative critical components: Networking among DNS teachers and MDC staff

Teachers discussed wanting to be able to network with other DNS teachers using computer based tools such as a networking website, a listserv, bulletin board, or teacher forum. Teachers wanted to be able to share ideas about supplemental activities, purchasing supplies, sharing equipment, etc.:

Because if there are other fourth grade teachers who are teaching the same thing that I’m teaching, and somebody else is developing, um, SMART Notebook activities for vocabulary review, wouldn’t I love to be able to just steal theirs and trade off something that I’ve done, and you know I mean. And kind of pass it on. So maybe having some opportunities for other people in the same grade level to have communication with each other to, to share stuff.

Educative critical components: Teacher content knowledge

Teachers discussed concerns with their lack of knowledge of some DNS content. Several teachers said they struggled with macroinvertebrate identification in particular: "...the invertebrate, invertebrate one is tough. I mean, I don't know any of those things by eye." Teachers brought in education consultants or other experts to help with macroinvertebrates:

...we have a dad that works at Monsanto who volunteers to come, and does the macroinvertebrate station. Because it's really, really, really hard...I've done it by myself before and just been like yeah that's a, um, that's a...[mumbling]. I'm like cheating and not even following the dichotomous key [mumbling].

Pedagogical critical components: Teacher use of differentiation

Teachers discussed using differentiation to adapt DNS to individual students, and that the assessments included with the curriculum do not take into account individual student differences: "Each student has a different level of learning and understanding, comprehension, on and on and on...So, when you're testing them, you have to know how much that particular child can do, and grade them on that level."

Pedagogical critical components: Teaching reading and writing

Teachers discussed using DNS to teach subjects other than science. Several mentioned teaching reading using DNS, particularly "reading comprehension strategies in nonfiction texts." Teachers also mentioned teaching writing, including "more formal lab reporting," with DNS.

Student engagement critical components: Student enjoyment

Teachers at the focus groups discussed how the DNS program facilitated student engagement. Some teachers mentioned how students took ownership of the student books. Also, there was widespread agreement that students enjoyed DNS activities, particularly the field experiences:

...the curriculum was written so well that without any background I could go in and teach. I mean I had to study and make sure I knew what I was talking about...But, year after year the kids like it, um, we go to [field experience location] at the end of the year and do our field study day, and that's been a highlight...and I've got kids that go on some pretty nice trips and, ...my very first time I went, I had a sixth grade boy say this was the best day of my life – I was like 'it was 40 degrees out there kid,' but you know ...they really did enjoy; it was easy for me to teach.

Um, one of the best things for me is...the field experience, when I take these kids out that...I would consider to be excelling in the classroom, in the sense that, you know, they hate coming to school – 'I don't really want to do it. This is boring.' And they, they're outside and they're doing things and they're smiling and they're laughing and they're, they're in their element. And they are learning and having

a blast. That's, I mean, after that first field experience, in seeing those kids. I thought, OK, you've sold me.

Student engagement critical components: Student relevance

Teachers generally thought that students could relate to content in the DNS curricula, including water conservation activities in *CMAE*:

Um, I like how it really helps the kids, it really relates to them...especially when we talked about the water usage, because I'm doing the Aquatic Ecosystems. The kids loved seeing how much they were using, and they tried to cut back. And then I also have a student who, um, he has to donate somewhere every year to some organization he's picking. One of these organizations he donated his money to because he likes what we're doing so much in class. So, I like how it relates to them so much.

Teachers also liked that DNS focused on Missouri species and habitats gave students a “sense of place.”

The, one of the big benefits I've noticed, the kids realizing that it's Missouri. You know, they always learn about other countries, and other places in the world, but there's not a lot of things talking about things right here and where we're at. I mean, they'll do the My State thing when they're in whatever grade it is, but they enjoy that it's Missouri's systems. And, they, it makes them look at things a little differently at home than just reading a book, in a book about...somewhere else. So it gives them that sense of place that I think they're missing a lot.

One teacher said that DNS got students out of “their own little bubble.”

...several years back we had, you know, a natural wetland behind the football field and they've since bulldozed that all over and kind of taken it down to bare earth. Well, last year they were able to see the massive amount of erosion that was going on, you know, just right behind the schools. And they could see – well why are all these little rivulets forming? What, what's happening here? So, um, you know, it gets them out of their bubble quite a bit. And that's kind of what I'm going for, you know, what I would love to see with our kids is you don't have to enjoy nature, but I want you to be able to respect it. I want you to not be driving down the road thinking it's OK to throw out your wrappers, or, you know, put your oil in the creek, and you know, you need to think bigger than just you.

Several teachers mentioned that their students who hunt and fish could relate to the curriculum because they were familiar with the animals and ecosystems. One teacher said that students liked the “down to earth language” in *Nature Unbound*.

Student engagement critical components: Student environmental concern or connection to nature

Teachers believed that DNS increased their students' connection to nature and environmental concern, with several saying that DNS helped students realize how humans were impacting the environment in their specific areas:

The thing for me is once you open up awareness to life, and the need for us to support that life, how more conscious students are about throwing, just throwing trash on, you know. I mean, that piece of paper gets there and...the ants can't move around. And that consciousness becomes theirs, and how, seeing them apply that...I was just raised that you don't litter, but they need, they need a reason for everything you ask. And now, if that's their reason, that works for me.

Several teachers mentioned how DNS caused their students to want to protect insects:

...I work in the city with some kids who think they are just as tough as nails. And they are, but let me tell you what, see a bug and they scream like a girl every time [laughter] ...but what is neat about it is instead of doing that, their automatic reaction is to kill it, and, it, they lose that. They don't want to just kill it and get rid of it, they want to find out more about it now...

One teacher said that students who hunt get different and valuable outdoor experiences in the DNS program:

Well they don't observe nature in their hunting. Their focus is hunting and to get that animal. But if you ask them if they've ever looked at oak trees or...other little animals or insects that live in the forest, or live in the prairie, or compare the prairie to the forest, they, they've never done it in that way...I have kids and they're outside all the time, maybe. But they're not outside in nature...I asked a kid the other day if – he hunts, he hunts all the time, but he's never been camping. He had never heard barred owls...there's just so many things that they've never done, and I think that Nature Unleashed brought that out some.

Student engagement critical components: Student observation, journaling, and data collection

Finally, teachers talked about how the DNS curriculum allowed students to practice observation, journaling, and data collection when they do activities such as “dutifully take the temperature and write down the time and look at the clouds” when outside. One teacher said that students were doing, “more formal lab reporting. Not just the, the journaling in the notebook, but taking that to the next step where they were kind of identifying the different parts of the scientific method, and writing about that formally.” One teacher recounted students were engaged by raising a mealworm:

You know, get them [students] interested in something that in the end they can figure out how it goes. Just a little bitty mealworm turns into this big old black bug. Un, un, Mrs. N, it can't do that. Well, I say it can. We're going to figure that out, so how are we going to do that? I'm going to give you this worm. You're

going to raise it. Huh? And to see them go through all of that and keep up with that and track that. You could, I couldn't get you to draw a picture, I couldn't get you to write a note, but now that you're the dad to a worm [laughter]. You know, you want to be responsible for keeping a station clean. You're now, you're learning how, you need somebody to teach you how to use a ruler, because you're tired of using a piece of cardboard. Because now you've got an interest in processing and explaining. And that, for some of our students are what makes them go, OK, I do need to know how to read, I do need to pay attention. You know, that's the niche for them, 'cause some of the other stuff don't do it for them.

Discussion

Limitations

As with all qualitative research, this study cannot be generalized to the larger population of DNS teachers. It is likely that the teachers who agreed to participate were more committed to the program than other teachers and may not use the curriculum in ways that are “typical” of most DNS teachers. Also, despite our best efforts, the themes and subthemes we identified are not mutually exclusive.

Discussion

We found Century, Rudnick, & Freeman's (2010) model worked well to organize the themes from the focus groups. While we had thought that the focus groups would mainly deal with structural critical components (procedural and educative), teachers also discussed topics related to instructional critical components (pedagogical and student engagement).

The teachers at the focus groups were committed to the DNS program. They appreciated the opportunity to discuss the program with other teachers and they wanted to know that their voices were heard by MDC. As one teacher put it:

I'm hoping that this [focus group meeting] is going to be valuable. Um, I think just hearing other people's perspectives on it has been invaluable for me. I mean, it goes back to that networking that what every teacher wants is to find out what someone is doing so that we can steal that idea.

This study demonstrates that studying FOI is particularly important when evaluating a curriculum that is optional for teachers in most school districts that use it. The ways that DNS is implemented in individual classrooms were all over the map. The differences in the extent that DNS curriculum components were taught seemed largely driven by how well teachers thought DNS addressed the academic standards of their districts. It was harder to fit in DNS, or justify using DNS to administrators, if it was not well aligned with standards. A related issue was lack of time within the curriculum to teach DNS. However, this lack of time presumably would not be an issue if teachers believed DNS was addressing core curriculum components.

There were institutional barriers which impacted FOI. Bureaucratic headaches with grant administration were common. Teachers also found the logistics of field experiences (e.g., availability of busses) challenging. Paying for field experiences, even with MDC grant money, was also a challenge. Some teachers felt isolated because they were the only teacher in their school who taught DNS.

Pulling off intensive field experiences required outside support from education consultants, parents, and school personnel. Some teachers had more outside support than others, and this affected FOI. Some teachers talked about field experiences being annual events that parents and school administrators got excited about and helped out with, while other teachers needed more help.

DNS has many outdoor activities, and challenges teaching outside affected FOI. Weather could affect outdoor lessons in any season, but teachers tended to avoid teaching DNS during the winter to avoid poor weather. Teachers at the focus groups thought that some teachers chose not to use DNS because they were uncomfortable teaching outside. Of particular concern was a perception that discipline problems increased outside. However, some teachers said teaching outside decreased student behavior problems.

Teachers at the focus groups stressed the importance of being able to network with other DNS teachers. They also talked about challenges when their content knowledge in a particular area was lacking. These factors could affect FOI.

Teachers brought up several topics that fit under pedagogical critical components of FOI, including differentiation and how they used DNS to teach reading and writing. Teachers thought DNS did a good job at addressing student engagement critical components of FOI, including fostering environmental concern or connection to nature and observation, journaling, and data collection.

It is important to examine FOI using a variety of methods (Mowbray et al., 2003; Ruiz-Primo, 2006). As we already mentioned, we will triangulate these results with quantitative and qualitative data from the remainder of this study. Although there have been advances in conceptualizing FOI, there needs to be more work on measuring and statistically modeling FOI (Mowbray et al., 2003; Zvoch, 2012). Investigating FOI in conservation education programs appears to be in its infancy. Evaluators of conservation education programs need to first acknowledge that FOI can affect program outcomes, and then develop common terminology and methods to measure FOI.

Recommendations

We make the following recommendations about the DNS program based on preliminary results of this study:

- Keep the DNS program and do not change it too much: There was a lot of support by teachers for the DNS program and even concern that the focus groups might be part of an effort to get rid of the program. When revising the program they implored, “don’t do it too fast...so that you’ll throw the baby out with the bathwater.”
- Understand that many, if not most, teachers may not use the DNS curriculum “cover-to-cover”: Teachers at the focus groups tended to use DNS in addition to existing curriculum materials, and few said they taught all the lessons as written. This has obvious implications for the effectiveness of the program.

Curriculum materials

- Integrate technology into DNS: Teachers wanted DNS “apps” that helped with field identification of tree or animal species, interactive vocabulary practice, supplemental multimedia online material, virtual field trips, wildlife webcams, integrating existing apps (such as Aurasma), links to articles in *Missouri Conservationist* magazine, and games for students to practice identifying fish or other animals, learn about food chains, etc.
- Align DNS with current academic standards: This one is tricky because Missouri may never adopt NGSS standards; however, individual districts in the state are doing so. However, the Common Core math and reading standards have been adopted by the state, so these should definitely be reflected in DNS.
- Revise CMAE to eliminate some content and be aligned with current academic standards: Teachers thought CMAE was “textbooky” and tried to cover too much content. Also, the text needs to be aligned with NGSS standards. Note: CMAE is currently being revised.
- Consider identifying which activities are appropriate for specific grade levels or describe how activities could be adapted for different grade levels: Teachers pointed out that each DNS unit covered a three year grade span and that some activities were too easy or too difficult for certain grade levels.
- Determine if individual DNS activities are an appropriate length: Some teachers said that individual lessons took longer than indicated in the Teacher Guides.
- Consider having alternate indoor activities, particularly for *Nature Unfolds*: Teachers pointed out that *Nature Unfolds* had activities for all seasons and that winter was a tough time to go outside.
- Understand that some teachers may not be comfortable with the *Nature Unfolds* student book because most of the “baby” turkeys die: One teacher found it “depressing” to read the book to kindergartners.
- Consider adding more supplemental teaching materials, particularly for *Nature Unbound*: A couple of secondary teachers requested supplemental materials such as online study guides, tests, and quizzes.

- Review pre- post- unit assessments and end of lesson quizzes: Some teachers thought the DNS pre- post unit assessments were too long, too specific, focused on “rote memory” instead of applying knowledge, or were not formatted well. Several teachers said they gave “open note assessments.” Also, a teacher questioned the validity of using a test that covered the entire unit when not all the lessons may have been covered.
- Consider adding a glossary to the student books that currently lack one: Beware that glossaries were polarizing as some teachers wanted them, but others did not.
- Provide curriculum materials in Spanish: Some teachers talked about challenges using DNS with Spanish speaking students. MDC should consider providing DNS materials in Spanish.
- Investigate ways to accommodate special education, disabled, and at-risk students: One teacher suggested having field trips “more handicap accessible” and having an audio version of the student book for students who cannot read.

Grants

- Review how DNS field trip and supplies grants are administered: Teachers found it difficult that MDC only provided half of the grant money up front, with some teachers having to buy supplies with their own personal money and wait to get reimbursed until the end of the grant period. Several teachers wanted money after the first year to replenish supplies or buy new ones once they got a feel for what they needed.
- Review the field trip grant funding formula of \$7 per student, requirement of at least 10 students in a class, and 100 mile travel limit to make sure grant requirements are fair and equitable: The amount of money for field trip grants, requirement of at least 10 students, and 100 mile travel radius were barriers for teachers with fewer students.
- Provide a list of vendors for supplies: Even though it sounds like some education consultants are already doing this, a centralized online list of vendors might be helpful to teachers.

Training/support

- Provide an online mechanism for DNS teachers to communicate: Being able to share ideas about supplemental activities, purchasing supplies, sharing equipment, etc. via a website, listserv, or bulletin board, or teacher forum was a popular idea among teachers.
- Review ways for teachers to increase their content knowledge: Teachers at the focus groups acknowledged gaps in their knowledge, with macroinvertebrate identification causing more than its share of consternation. MDC could look at ways to fill these knowledge gaps.
- Consider ways to limit time outside school hours for DNS trainings: Teachers said that not having enough after school time for DNS training was a barrier. One suggestion was to do trainings during teacher work days.

- Investigate ways to keep EC response times appropriate: Teachers were pleased with the advice and support education consultants provided. However, some teachers complained that they would sometimes have to wait too long for a response from their EC. An “appropriate” response time may be in the eye of the beholder as one teacher wanted a response “within 48 hours” to at least acknowledge a request for assistance. Teachers recognized that EC workload due to cut positions and the increasing popularity of DNS likely impacted response times.

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Table 1

FOI of DNS program, based on Century, Rudnick, & Freeman (2010)

Structural critical components		Instructional critical components	
Procedural	Educative	Pedagogical components	FOI student engagement components
Importance of DNS program	Alignment with standards	Teacher use of differentiation	Student enjoyment
DNS curriculum materials	Networking among DNS teachers and MDC staff	Teaching reading and writing	Student relevance
DNS grants	Teacher content knowledge		Student environmental concern or connection to nature
Field experiences			Student observation, journaling, and data collection
Support			
Time for DNS			
Teaching outside			
Extent curriculum components are taught			

Appendix A: Focus group script

Introductions:

Good evening and thank you for joining our discussion tonight. My name is Dain Palmer. I work for the University of Missouri. Assisting me tonight are _____ and _____ with the Missouri Department of Conservation. None of us is directly involved with the Discover Nature Schools program.

Orientation:

We want to hear what teachers think about the Discover Nature Schools program. You were invited to the discussion because you all have received the Discover Nature Schools curriculum guide. Tonight we'll be discussing your thoughts and opinions about Discover Nature Schools.

For today's discussion we'll follow a focus group format. The purpose of focus groups is to gain insight on various views and perceptions in a structured format. This is different from a general discussion because there are specific questions outlined. There are no right or wrong answers but rather differing points of view. Please feel free to share your point of view even if it differs from what others have said. Before we begin, let me suggest some things that will make our discussion more productive. Please speak up; only one person should talk at a time. We're taping our discussion tonight because we don't want to miss any of your comments. We'll be on a first-name basis tonight.

The results of the discussion will help the Missouri Department of Conservation better understand what teachers think about the Discover Nature Schools Program and is part of a larger effort to explore how Discover Nature Schools is being used in classrooms.

My role here is to ask questions and listen. I won't be participating in the conversation, but I want you to feel free to talk with one another. You don't need to agree with others, but you must listen respectfully as others share their views. I'll be moving the discussion from one question to the next. There is a tendency in these discussions for some people to talk a lot and some people to not say much. But it is important for us to hear from each of you tonight because you have different thoughts. So if one of you is sharing a lot, I may ask you to let others talk. And if you aren't saying much, I may ask for your opinion. We should be finished by _____.

Now let's begin. Let's find out about each other by going around the table.

Opening question

- 1) Please tell us your name and what grade levels and subjects do you teach.

Introductory questions

- 2) What environmental education curricula have you used in your classroom?

Transition questions

3) What caused you to start using the DNS curriculum?

Key questions

4) What are the benefits of using DNS?

5) What challenges do you have when teaching DNS?

a. Tell me about the adequacy of the support your school provides to teach DNS.

b. Tell me about adequacy of the support the Missouri Department of Conservation provides to teach DNS.

6) What suggestions do you have to improve DNS?

a. What do you think causes some teachers in your school to not use DNS?

b. How well does DNS addresses issues that your students can identify with?

c. How well does DNS helps you teach academic standards?

7) How do you adapt DNS in your own classroom?

a. To what extent do you usually use all the lessons in each DNS unit?

b. To what extent do you use outdoor learning during DNS lessons?

Ending questions

8) If you could give DNS a report card, what grade would you give DNS and why?

9) Of all the things we discussed about DNS today, which one is most important to you?

10) Is there anything we should have talked about today but didn't?