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Montshire NIH Health Research Project: Interim Evaluation Report
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I. Introduction, Background, Purpose of the report

This interim report highlights our findings from Inverness Research's evaluation work so far in 2011. The feedback and findings are based on several data sources: observations of the May research symposium at the Montshire, interviews with students at the symposium, interviews with teachers over the telephone and at the symposium, and surveys of students both before and after experiencing the unit (nutrition).

We envision the findings presented here as formative feedback to assist you in your future planning.

II. Overview of the report

We present our feedback and findings by unit. That is, we will begin with the nutrition unit, starting with feedback about the May symposium and both teachers' (both cohorts) and students' experiences with the nutrition unit. We follow with a discussion of what we heard from the first cohort about the sun safety institute and their plans for teaching these materials. We end with a brief summary and our reflections.

The Research Symposium at the Montshire

The purpose of the research symposium, as described to the teachers at the institute in the summer of 2010, was to provide an opportunity for students to experience presenting the findings of the research project they conducted as part of the nutrition unit to outside audiences.

Thirty students from 4 schools participated in the symposium, along with 8 teachers from 5 schools (two teachers did not bring students, but attended the symposium). In addition, 3 scientists from Dartmouth participated, along with 5-6 parents, and a local newspaper reporter.

The students and teachers were genuinely enthusiastic and pleased to be at the museum presenting their research. They set up their poster boards throughout the room and everyone had some time to roam around the room and look at the posters.

One of the Dartmouth researchers gave a keynote address praising the posters and presenting a very brief overview of the Dartmouth research. She noted that this was an important program because:

- middle school is an important time, where students become more independent and start making their own choices about what they eat and how they spend their time;

- the program gives the students first-hand experience presenting real research results -- the same kind of experience that she and her colleagues have when they go to conferences and share their research and findings; and

- the program allows the Dartmouth researchers to learn from the students -- to get ideas about where they can go with their own research from the students and the research they have done.

This keynote set a nice tone for the event, and provided a good frame and presentation for the whole program.

The students were then divided into three groups in two different rooms. The posters were set up one-by-one on a table, and students took turns giving formal presentations of their findings to small groups, and answered questions at the end. Some groups were more prepared for the formal presentation aspect, and other groups had come in expecting a science fair situation where they would simply "man" their posters and answer questions. However, even the students that weren't as well prepared did a good job presenting their work. They were especially good at fielding questions from the group. The students were asked difficult questions, and when they couldn't answer them, they talked about how they would design their studies differently, gather more data, frame their questions differently, etc.

<u>The Research Projects</u>

There was a range in the quality and depth of the research questions and projects. The Dartmouth researchers noted several projects that were relevant or related to work they had been doing. The posters include the standard science-fair format -- question, hypothesis, data, results and in some cases, "fun facts."

Research questions included:

- Which snacks do people prefer more -- pretzels or jelly beans?
- Do students who participate in a team sport exercise more in a week than people who don't participate in a team sport?
- Are smoothies or fruit more popular? Which do people like better?
- What snack food was chosen to be the most popular by 5th and 6th graders, and which snack food was healthiest?

-Which kind of factory-made chocolate chip cookies have the fewest calories per ounce?
- What is the healthiest potato product in total fat per typical serving?
- What type of milk is preferred by students at [our school], and which is healthiest by protein, calcium, fat and sugar?
- Brain gym: is it helpful or a waste of time?
- During what activity are kids most active during PE?
- Do people eat enough fruits and vegetables?
- Some people in our families have heart problems -- how does caffeine affect your heart rate?
- Does low-fat food taste the same as regular food?
- Which middle school grade level consumes the most fruit at lunch?

Student Experience

We interviewed 14 of the students, representing all of the schools that came to the symposium.

All the students interviewed said the nutrition project, and the research project, were enjoyable. They liked coming up with research questions and testing out ideas. They also had questions that they wanted to explore next based on the research they had done. Some sample comments from the students about their research experience:

> *Fruit is a big part of our diet and it is important.*
>
> *We thought the 8th graders would eat more fruit because they are old enough to know better, but that wasn't what we found out when we did our research. Our next step would be to test out if the fruit they like to eat is available in the cafeteria.*
>
> *Our hypothesis was true, that people who play team sports in school get more exercise. But we also found out that people involved in outside sports and activities still get a lot of exercise.*
>
> *I learned a lot about the process of research. It is a lot of work. You have to go online, do other research -- you have to back up what your findings are.*

When asked how much data you need when you are doing research, a 5th grade girl replied:

> *You need a medium amount of data. You need enough to feel comfortable with your results but if you get too much, it takes too long to go through.*

One 5th grade student had two poster-boards full of results to share. He said:

> *We did the unit on nutrition and I found out how much fruits and vegetables I was supposed to be eating, and I wondered if was different. I found out I wasn't eating enough. Then I wanted to see if where you lived mattered. So I sent the*

survey I developed out to my family who live around the country, and I asked them to share it with people they knew. The results came out pretty much like I thought they would mostly, except for finding out that people who live in colder areas eat more fruit. I think if I surveyed more people, the results might come out differently. Research takes a lot of time -- to tally all the data.

Teacher Feedback

We interviewed 5 teachers at the symposium about teaching the nutrition activities as well as preparing for the symposium. Here we present their reflections on preparing for and participating in the research symposium.

Two teachers originally did not think they would have time to do a research project, but they did have time at the end of the year, and they were very pleased to have their students included in the science symposium. Another teacher and her students completed the research projects early enough to have her students practice their presentations (and they were very polished and prepared -- more so than the other groups).

One teacher was surprised by the set-up of the symposium -- she expected it would be more like a science fair where students stood by their posters while people roamed around and asked them questions. She felt bad that she hadn't prepared them better for what they were going to be asked to do. However, the students managed well.

Two teachers who planned together felt that getting to come to the Montshire for the research symposium was a motivator. One thought the emphasis on research was a big benefit of these materials over other nutrition materials she has used, noting that the research process is "an area we had a weakness in." The school hosted a community wellness fair, with blood pressure checks and activities. In one of the schools, they did a learning kitchen project where students made and tested healthy snacks.

Reflections from the Dartmouth Researchers:

We very briefly spoke with two of the Dartmouth researchers who attended the symposium. In general, they were impressed by the students' research, which they said was better than what they expected. They noted that some of the findings in the students' small projects were similar to the larger research projects that have been done at Dartmouth. One felt that the students were "on their way as researchers." One also noted that the main struggle the students had – figuring out what is a good, testable research question -- is the same issue they (as researchers at Dartmouth) struggle with. She seemed to appreciate that all the questions weren't great, and the students were able to see the range of questions and learn from that. They also learned from the questions they were asked during the presentations. Finally, one researcher also thought the students did a good job of honing in on something small enough and manageable enough to research.

Overall, we see the research and symposium component to the project a success and one that should continue. Perhaps sharing more details about what the teachers and students can expect at the symposium, and providing support if needed, could improve the experience.

The Nutrition Unit

As of September 2011, most of the first cohort had implemented the nutrition unit, and brought students to the research symposium. In addition, a second cohort of teachers has attended the summer institute at the Montshire to learn about the nutrition activities and how to implement them. In this section, we highlight feedback we received from cohort one teachers as well as the results of their students' pre- and post-unit assessments. In addition, we reflect the feedback of the cohort 2 teachers about the summer institute.

Implementation of the nutrition unit: Cohort 1

In the spring of 2011, we interviewed a sample of teachers who had implemented the nutrition unit. In general, teachers felt that the activities worked well with the students, and that they were well-received. Teachers were also happy with the level and quality of support they received from the Montshire in their implementation efforts. For the teachers who conducted research projects with their students, they found this aspect of the project to be highly valuable.

One teacher, along with her fellow teachers, had done the initial pilot, so this was their third year teaching the nutrition unit. She reported that it was the best year yet.

Another teacher mentioned that the nutrition unit could have been "beefed up" more. He would have liked more activities to do with the students. He did the calorimeter activity thought that was very successful. The other activity he thought went very well was the "what does 200 calories look like (food) and what does it feel like to work off (exercise)." The same sentiment was also shared by a teacher we interviewed over the phone earlier in the year. She found she needed to supplement the unit quite a bit. She felt that the unit was just "bare bones" and needed both additional background information and activities.

Two teachers said that the nutrition unit has been a catalyst in their school. One showed the movie "Supersize Me," and he and the students have talked about it throughout the school year. He said:

> *This really changed me personally. I'm paying a lot more attention to what I eat -- it was really impressive for me.*

Both teachers felt the support from the materials and the Montshire was extremely valuable. One teacher said she wanted a listserv or something like that throughout the year where they could share with one another what they were doing and learning from implementing the curriculum.

Student Experience – Cohort 1

We created pre- and post-questionnaires for students to take prior to and following experiencing the nutrition unit. Not all students answered all questions, but approximately 377 students completed the pre-questionnaire, and 157 completed the post-questionnaire. The questionnaire asked students to rate their level of interest in and knowledge of nutrition and health; what factors influence what they decide to eat (such as advertising, food their parents prepare, labels on packages, time, etc.); their diet and exercise habits. They also rated their level of agreement with statements about diet and exercise, such as "A school-aged student needs 1,600-2,500 calories in a day." Finally, the questionnaire asked students about their experience with and knowledge of conducting a research project.

Inverness Research analyzed the responses and found there were a few questions where the difference pre- and post-unit was statistically significant. Prior to the unit, 28% (N = 375) of students rated their knowledge level of nutrition and health a 4 or 5 out of 5 (5 = a lot). Following the unit, 76% of students marked a 4 or 5 for this question, representing a significant increase in their rating.

In addition, students' ratings of their agreement with the following two statements showed a significant positive difference after the unit:

"A school-aged student needs 1,600-2,500 calories in a day" and "If we take in more calories than we use each day, our body weight will stay the same."

Finally, students rating of their experience with or confidence in conducting a research project after the unit showed a significant positive change (37% 4 or 5 before, and 49% after).

In terms of 2 factors that influence their food choices, the top 3 prior to experiencing the unit were:

The food my parents make for me (66%)
The food that's available at home (66%)
How much time I have to eat (18%)

After the unit, the top 3 factors were:

The food that's available to me at home (58%)
The food my parents make for me (57%)
The labels on the packages (26%)

Prior to the unit, 15% of students marked labels on the package as a top consideration, suggesting that their experience with the nutrition unit may have prompted them to consider nutrition labels in their food choices.

Finally, we asked students to indicate with a checkmark which are the important things to consider when designing a research project. The options were: coming up with a testable question, gathering data, analyzing data, and presenting data.

Prior to the unit and conducting their research project, the students ranked gathering data as most important, followed by analyzing the data, coming up with a testable question, and then presenting data. The order did not change after the unit, however there was an increase in the number of students that checked "analyzing the data" and "coming up with a testable question" after the unit.

Overall, the unit seemed to increase students' perceptions of their understanding of key ideas about health and nutrition. Further, there seemed to be an increase in their attention to nutrition labels as a result of their experiences.

Cohort 2 – Nutrition Institute 2011

Following the 2011 nutrition institute, we interviewed 7 teachers who attended the institute over the phone, in exchange for a $35 Amazon.com gift certificate.

Background/Teaching Health and Nutrition

All of the teachers we spoke with work in small rural schools with fewer than 300 students. All but two of the teachers we spoke with are multi-subject teachers or either 4th or 5th grade. One of the two secondary teachers was a science teacher, and the other teacher's courses are related to health and nutrition. None of them had participated in professional development at the Montshire before the institute.

Most teachers don't anticipate devoting much of their curricula to health and nutrition, with the exception of the nutrition teacher. Most teachers also have a moderate amount of experience with "hands-on" teaching. Teachers currently create curriculum from their own varied sources. Their level of confidence and knowledge varied from not at all to very confident following the institute.

Barriers to implementing a nutrition and health unit ranged from time to fit the material into the curriculum to funds for supplies, to the expense of healthier food options in a low-income community.

The Institute

All of the teachers we spoke with were very pleased with the institute and felt it was very high quality and beneficial. In particular, teachers mentioned the following as strengths of the institute:

- organized, well-thought out, informative, and engaging
- actually doing the hands-on activities
- quality and expertise of the people leading and planning the institute

- the research project component

Teachers mentioned the following weaknesses:

- information not in-depth enough; too "basic"
- needed more specific information about how to help students design research projects
- some "slow-moving" portions
- some people didn't have people to brainstorm plans with

Their overall impression of the curriculum was generally positive. They felt there were solid activities included in the unit, and seemed "doable."

The Research Project

Teachers were generally enthusiastic about the research project component of the curriculum. One elementary teacher noted that she anticipated her students needing a lot of guidance. They all felt that it was valuable to hear about the experiences of the cohort one teachers, and a few noted that actually designing and conducting their own research project was very valuable.

Implementation

All of the teachers plan on implementing the materials to some extent. They expect they will need minimal support from the Montshire, primarily with the research projects or with the calorimeter lab. All of the teachers planned on doing some version of a research project, and many anticipated bringing their students to the symposium in the spring.

Follow-up

All of the teachers were appreciative of the Montshire and the support for the institute. Many of them are interested in sharing what they do in their classes and hearing from others about their experiences. For one teacher, face-to-face follow up was a question because of the distance from her school to the Montshire.

We asked the teachers about their sense of their role in the project – that is, if the felt they had a role in addition to being a participant, or if they could foresee taking more of a leadership role in future institutes. The returning teachers from cohort 1 in particular really enjoyed the opportunity to share their experiences with the teachers in cohort 2. One teacher remarked:

> *I really love the idea of taking on leadership roles. I did learn when I heard from others, from people who felt they didn't do well or were very successful, and they got important feedback. Everyone learned from each other, both the new people who will have a better sense of it when they go out, and the first cohort learned too. That was a great experience.*

Sun Safety Unit

We were able to reach 3 teachers from cohort 1 who attended the sun safety institute. Of the teachers we spoke with, 2 felt that the institute was quite valuable. One teacher felt that it fell quite short of the nutrition institute the year before, and left unsure as to how to approach teaching the unit – in particular how to lead students in an original research project.

All of the teachers had little to no experience addressing the issue of sun safety in their teaching. Some of them had experience teaching about components and types of light in their physical science units.

The two teachers who were more positive felt that the materials were good and useful, and plan to incorporate use of the technology (probes and meters) in their lessons.

One teacher felt that this institute allowed more time for sharing and talking among the teachers.

The teacher who felt it was less successful mentioned the following as the key weaknesses:

- not enough time with the actual activities, therefore, they feel less prepared to teach the material
- lack of communication about each day's activities
- lack of focus on how to help students design and conduct an experiment in sun safety

All three teachers felt that the opportunity to share what they learned teaching the nutrition unit with the second cohort was highly valuable. They also felt that participating in the symposium – for those who were able – was extremely valuable for themselves and their students.

III. Summary/Capstone thoughts on the project

The Montshire has successfully interacted with many teachers and schools throughout Vermont and New Hampshire. Montshire staff have developed classroom activities around studying nutrition and sun safety, as well as activities designed to engage middle school students in conducting their own health research activities, that teachers say are much-needed, and both teachers and students are finding positive. The May symposium connected teachers and students with Dartmouth College health science researchers, and allowed students to share their research findings with other students and teachers from the region. Teachers and students are enthusiastic about their experiences with the project and the Montshire.

The project has already developed growing capacity within the region to teach health science in authentic and meaningful ways for students. The project is also creating an ever-growing network of teachers and students throughout the region. By the end of this academic year, there will be a significant number of teachers who have had enough experience with the nutrition unit to play a strong role in future institutes, or with school-site support for newer teachers. Making a stronger effort to keep these teachers connected, perhaps even if it is electronic connection, seems like a good idea.