Vermont Early Literacy Initiative -- Science, Technology, Engineering & Mathematics (VELI-STEM) Project

Evaluation Report:
Analysis of Librarian Post-Training Survey Data

May 2016

SURVEY OVERVIEW: On April 25 and 26, 2016, the VELI-STEM Year One Librarian Training: STEM Inquiry -- Force & Motion was held at Lake Morey, Vermont. On the afternoon of the second day of the training, an on-line survey link was distributed via email to the primary point of contact for each of the 25 original VELI-STEM libraries, plus an additional (26th) library that was added to the project sample in case of any future attrition. The purposes of administering the post-training survey were to:

a. Assess the effectiveness of the April training and shape future trainings;
b. Measure any change in librarian proficiency in key constructs involved in the delivery of STEM programming to 3-7 year old children, since a baseline measure was taken in February 2016 prior to librarians receiving any training;
c. Inform future replication of the VELI-STEM project in Vermont and nationally.

The post-training survey measured almost identical constructs as those that were measured at baseline and as those that will continue to be measured along the course and at the end of the VELI-STEM project, to help gauge progress toward and the final achievement of the following two project outcomes:

1. Participating VELI-STEM librarians are better able to recognize opportunities to incorporate ongoing STEM learning experiences for 3-7 year old children and their families throughout their library-based and community-based practice.
2. Participating VELI-STEM librarians are more intentional in highlighting STEM literacy in Story Times and all other child and family focused programming.

SURVEY FINDINGS:

Response Rate
- 26 responses were received from the 26 surveyed VELI-STEM libraries (100% response rate)
  - ➢ 8 (31%) of the respondents hold the primary role of library director
  - ➢ 18 (69%) of the respondents hold the primary role of children/youth services librarian

Receipt of STEM Text
- 26 (100%) of the 26 surveyed VELI-STEM librarians received a copy of Worms, Shadows and Whirlpools: Science in the Early Childhood Classroom by Karen Worth and Sharon Grollman of Education Development Center, Inc. (Heinemann, 2003)

STEM Knowledge & Skills -- Statistics			
Librarian self-assessment of their STEM knowledge and skill level on a *scale of 1-5 --	**Baseline**	**After the Two-Day Training**	**Change in Percentage Points**
Ability to identify opportunities to incorporate ongoing STEM learning experiences for 3-7 year old children and their families	3.9	4.7	↑0.8%
Current regular provision (baseline)/intention of regular provision (post-training) of opportunities for 3-7 year old children to use basic science practices (e.g., plan and carry out investigations, develop and use models, analyze and interpret data)	3.1	4.6	↑1.5%
Sense of the different settings in which STEM learning experiences can be provided	3.8	4.6	↑0.8%
Prior access to (baseline)/likelihood of using STEM training and other resources (e.g., picture books, hands-on learning materials such as ramps and balls)	3.4	4.8	↑1.4%
Average =	**3.6**	**4.7**	↑1.1%
Range =	**3.1-3.9**	**4.6-4.8**	↑0.8%-1.5%

*Scale of 1-5, with 1 being not at all proficient and 5 being fully proficient.

STEM Knowledge & Skills -- Analysis

Comparative analysis of librarian baseline and post-training self-assessment data on STEM knowledge and skill levels, on a scale of 1-5 (with 1 being not at all proficient and 5 being fully proficient), indicates:

- AT BASELINE -- the 23 librarians who completed the baseline survey scored an average of 3.6 on the combined knowledge & skill items, with individual item scores ranging from 3.1-3.9, indicating a moderately strong (above mid-range) foundation upon which to build greater proficiency levels in each area and all areas combined.
- POST-TRAINING -- the 26 librarians who completed the post-training survey scored an average of 4.7 on the combined knowledge & skill items, with individual item scores ranging from 4.6-4.8, indicating a significant improvement (an increase of 1.1 percentage points or a 31% rate of improvement) over baseline.
  - ➢ The highest score of 4.8 was on the likelihood of using STEM training and other resources following the training, as compared to a 3.4 on access to STEM training and other resources prior to the training, which represents an increase of 1.4 percentage points or a 41% rate of improvement over baseline.
  - ➢ The lowest score of 4.6 was on the regular provision of opportunities for 3-7 year old children to use basic science practices, but that was still in the high range and was up from 3.1 prior to training, which is a significant improvement (an increase of 1.5 percentage points or a 48% rate of improvement). There also was a score of 4.6 on having a good sense of the different settings in which to provide STEM learning experiences, which -- again -- is still a high score and up from 3.8 at baseline, representing a considerable improvement (an increase of 0.8 percentage points or a 21% rate of improvement).

STEM Concepts & Delivery -- Statistics			
Librarian self-assessment of their understanding of STEM concepts and delivery on a **scale of 1-5 --	**Baseline**	**After the Two-Day Training**	**Change in Percentage Points**
STEM inquiry (e.g., broad skills related to asking open ended questions, using STEM vocabulary)	N/A (not measured at baseline)	4.5	N/A
STEM Water and Air concepts	3.7	N/A (not measured post-training since Year One not covering this concept)	N/A
STEM Force and Motion concepts	3.6	4.7	↑1.1%
STEM Sound and Light concepts	3.2	N/A (not measured post-training since Year One not covering this concept)	N/A
What it means to engage children in science-learning opportunities within a context of science engineering practices (e.g., ask questions, define problems, plan and carry out investigations, construct explanations and design solutions)	3.5	4.5	↑1.0%
How to encourage children to develop and use a range of science practices as described in the Next Generation Science Standards	2.3	3.9	↑1.6%
How to transfer acquired STEM knowledge and skills to early childhood educators in library's community	3.0	4.2	↑1.2%
How to conduct STEM outreach and informational exchanges with library's community (e.g., with library staff, directors and trustees; town officials; local businesses; and other key community members)	2.9	4.3	↑1.4%
Average =	**3.2**	**4.3**	**↑1.1%**
Range =	**2.3-3.2**	**3.9-4.7**	**↑1.0%-1.6%**

**Scale of 1 to 5, with 1 indicating that they strongly disagree that they have an understanding (baseline)/a *better* understanding (post-training) and 5 indicating that they strongly agree that they have an understanding (baseline)/a *better* understanding (post-training).

STEM Concepts & Delivery -- Analysis

Comparative analysis of librarian baseline and post-training self-assessment data on their understanding of particular STEM concepts and their delivery of those STEM concepts, on a scale of 1-5 [with 1 indicating that they strongly disagree that they have an understanding (baseline)/a *better* understanding (post-training) and 5 indicating that they strongly agree that they have an understanding (baseline)/a *better* understanding (post-training)], indicates:

- AT BASELINE --the 23 librarians scored an average of 3.2 on the combined concepts and delivery items, with individual item scores ranging from 2.3-3.2, indicating a moderate (mid-range) foundation upon which to build greater understanding in each area and all areas combined.

STEM Concepts & Delivery -- Analysis (*continued*)

Comparative analysis of librarian baseline and post-training self-assessment data on their understanding of particular STEM concepts and their delivery of those STEM concepts, on a scale of 1-5 [with 1 indicating that they strongly disagree that they have an understanding (baseline)/a *better* understanding (post-training) and 5 indicating that they strongly agree that they have an understanding (baseline)/a *better* understanding (post-training)], indicates:

- POST-TRAINING -- the 26 librarians scored an average of 4.3 on the combined concepts and delivery items, with individual item scores ranging from 3.9-4.7, indicating a significant improvement (an increase of 1.1 percentage points or a 31% rate of improvement) over baseline.
  - ➢ The highest score of 4.7 was on having a better understanding of STEM Force and Motion concepts, as compared to a 3.6 prior to the training, which represents an increase of 1.1 percentage points or a 31% rate of improvement over baseline.
  - ➢ The lowest score of 3.9 was on having a better understanding of how to encourage children to develop and use a range of science practices as described in the Next Generation Science Standards, up from 2.3 prior to the training, which represents an increase of 1.6 percentage points or a 70% rate of improvement over baseline. A couple of comments from the optional open-ended field of the survey cited challenges related to the with Next Generation Science Standards, which could be constructive in realizing future improvements in that area of STEM understanding (see page 5).

In Their Own Words

The last field of the survey offered librarians an optional opportunity to provide open-ended comments, observations and suggestions about the two-day VELI-STEM training on STEM Inquiry -- Force & Motion in April 2016, with 22 (85%) of the 26 respondents offering feedback. Consistent with responses to the baseline survey in February 2016, comments shared following the two-day training continued to convey an overall excitement about the project. A number of key themes about specific aspects of the training and about the project overall emerged in the comments that were shared on the Post-Training Survey, as cited in the table below. The two most frequently cited themes pertained to the hands-on format of the training and incorporating what was learned into their library practice.

Key Themes	TOTALS
Hands-on format of the training	14
Incorporating STEM Inquiry -- Force & Motion into library practice	8
Presenters at the training	6
Dissemination of training content and hand-outs	4
Training schedule	4
Collaborating with community stakeholders	4
Excitement about project	3
Data reporting	3
Next Generation Science Standards	2

The most common themes are listed below, along with a sample of two contrasting or similar comments on each theme, depending upon the nature of the feedback[1]:

- **Hands-on format of the training**
  - ✚ Good training, I learned a lot and am eager to put these things into practice. I especially enjoyed each of the stations that gave us ideas of things to do- like the cars and ramps, ball relays, etc.- and appreciated learning ways in which to use the info with even very small children and how I can use the things in story time, summer reading, or any kind of programs that will work for my community.
    - ☒ I know there was the thought that we would learn "concepts" through experience of playing and exploring the materials, but I would have liked the have the more concrete science terminology and principles on hand.

- **Incorporating STEM Inquiry -- Force & Motion content and principles into library practice**
  - ✚ Learning "inquiry-based explorations" is a benefit which could be carried over to other topics every day at the library.
    - ☒ We would have liked a little more background on the concepts of force and motion. Also, more background on the development of science concepts for 3-7 year-olds.

- **Presenters at the training**
  - ✚ The group of presenters was great: Wendy, Sally, Mara, Sharon, Greg and Karen. Thank you each and every one. You work so well with one another!
  - ✚ It was very valuable to mess around with the materials and have Karen Worth, Greg, Sally Anderson and Sharon Colvin walking around, observing, and modeling how to ask questions and guide the thinking and learning.

- **Dissemination of training content and hand-outs**
  - ✚ I really appreciate the fact that all information, powerpoints, etc., will be posted. I like to go back and revisit concepts...sometimes my shorthand is a little sketchy.
    - ☒ My recommendations/suggestions are: Have a list of sources for the construction materials [to] used at the workshop: source for cardboard boxes, tubing, etc included on the website. Do not wait to hand out/present all of the important paper forms, i[.]e. spreadsheets, PR forms, Photo release forms etc to be discussed on Day 2. Parcel out/present 1/2 of this on the Day 1. Followed by hands on stuff, or sandwiched between two-hands on period activities. This will keep our interest level up as well as keeping us energized. Receiving 1/2 of the paper forms etc. on Day 1 would give us time to reflect, mull over the Important data forms etc and bring any questions we do have to Day 2's morning meeting.

- **Training schedule**
  - ✚ I was grateful that the training went into the later evening after dinner so that we were able to fit as much as possible into the training.
    - ☒ The first day was a bit too long - I think the marble activity could have been shifted to the morning with a discussion following instead of having it after dinner and then discussing in the morning.

- **Collaborating with community stakeholders**
  - ✚ I think this experience can help bridge the gap which exists between many library and public school systems and foster collaboration between and within the community.
    - ☒ I find it too abstract to come back and try to describe what we are doing when I don't have the proper language, especially in a community where there are very science oriented families who DO know those terms.

- **Excitement about the training/project**
  - ✚ Fantastic opportunity for my library and community. So glad that we get to be a part of this exciting grant!

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[1] A full transcript of all comments and suggestions has been compiled in an Excel spreadsheet that is searchable by comment category and will be shared internally with the VELI-STEM Leadership Team, for their determination of any necessary follow-up action or course corrections.

- ✚ I've been offering STE[A]M programming at my library for older elementary-aged kids, tweens, and teens for years. Over the two days of the training I learned various ways to rethink those concepts and how to make them accessible to much younger children. I'm really excited about incorporating more STEM into my pre-K and young child programming.

- **Data reporting**
  - ✚ I am ... excited to participate in the data collection as a means to better understand and collect other pertinent information for professional purposes.
    - ☒ It would have been more helpful to me if the Excel spreadsheet [was] previewed either prior to the conference, or a draft of it [was] handy to refer to during our discussion. I am a visual learner and it was so small on the screen at the front of the room. I would like to have seen its functionality.

- **Next Generation Science Standards**
  - ✚ While I am not fully versed in the Next Generation Science Standards after this two day training, I am confident that I can and will be able to research further and make sense of the goal of the NGSS build skills along with my young patrons and their adult caregivers. Together we will all learn by doing!
    - ☒ Next Generation Science Standards were not introduced during any of the presentations, but do appear in the written materials that I have not had time to go over in detail. I'm sure that's [not] a big deal, since NGSS is more of a school thing, not a library thing, but still nice to be introduced to nonetheless.

Also, a few comments were made related to future trainings, such as:

- ✚ Lake Morey Resort is a delightful space, the location is so scenic and restful. There's creative space for conference members to be together as a unit, or break into a smaller gathering during free time: as well as space to be by one's self w/o being in tucked away in your room. The staff there is so kind and helpful.
- ☒ I'm worried about how fast paced the October meeting may feel so we can accomplish all that needs to be managed.