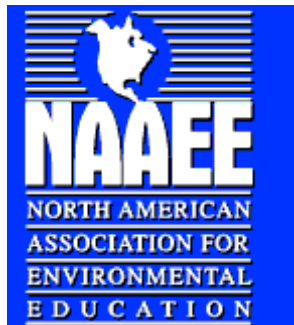# *Evaluation Report:*

Framework for the Assessment of Environmental Literacy

Prepared for:
The North American Association for Environmental Education

Prepared by:
Joe E. Heimlich, Ph.D.
The Ohio State University; OSUExtension@COSI

Contents

Workshop Evaluation

Framework for the Assessment of Environmental Literacy

The North American Association for Environmental Education (NAAEE) received funding from the Discovery Research K-12 (DR K-12) Program for a workshop to synthesize and theorize about assessments of environmental learning and to address the DR K-12 challenge: How can improved assessment of student knowledge and skills advance preK-12 STEM teaching and learning?

Background

Leaders of the only two large-scale assessments of environmental literacy used in the U.S. to date (Programme for International Student Assessment [PISA] and the National Environmental Literacy Assessment [NELA]), led by an experienced PI representing the North American Association for Environmental Education, proposed to develop a new, comprehensive, research-based framework for assessing environmental literacy. By bringing together, for the first time, experts in research, assessment, and evaluation from the fields of science education, environmental education, and related social science fields – professional communities that do not traditionally share knowledge – this project was intended to access and build on the existing literature and the insights of many disciplines.

The project leaders analyzed PISA and NELA and used a multi-disciplinary search and review of the literature to prepare a draft framework. The focus of this evaluation was the process, at the center of which was a workshop involving a diverse array of invited experts who were brought together to critique the draft framework and provide suggestions for revision. The leaders/organizers incorporated the input from the workshop in their production of a final Environmental Literacy Framework to be disseminated electronically and at a nationally advertised event held in early December 2011 at The National Press Club. The intention was that by collaborating with and accessing supplemental resources from other agencies and institutions (i.e., NOAA, OECD, OSU), the project would be able to both produce the deliverables and to disseminate them widely.

Method

The project had three overarching goals for the conference grant:

1.   Synthesize the knowledge and research base for environmental literacy, including its dimensions and precursors, and draft a comprehensive environmental literacy framework that identifies competencies, dispositions and behaviors. To achieve this, the project intended to:

2.   Produce and publish an Environmental Literacy Framework that had been critiqued by experts in science education, environmental education, and other related fields involved in assessing environmental literacy.

3.   Disseminate the Environmental Literacy Framework to a wide audience of assessment specialists, agencies making policy decisions about and funding work on assessments, and organizations working to achieve environmental literacy.

The evaluation was driven by four overarching evaluative questions. The first three served as the framework for the formative evaluation and relate directly to the two phases of the project; the fourth frames the accountability or summative evaluation. The questions asked:

1. In what ways did the planning process affect the understandings and beliefs of the Organizing Committee?
2. What is the value of the literature review by those most in positions to use it?
3. In what ways did the Workshop, through the work of building the framework, change the participants?
4. How do experts describe the effectiveness of the Workshop in providing a useful framework for the field?

The formative (developmental) evaluation began by engaging the organizing committee members and staff in the refinement of the project's theory of change and resultant logic model. This work was done collaboratively using a variety of media (e.g., conference calls, webinars, individual work, video conferencing). The model was incorporated into the evaluation measures for the other project phases.[1]

> *We need operationalized ways to assess dispositions/attitudes and behaviors so we can ask questions about the relationship between disposition, science content knowledge, and behavior. Right now it seems easiest (but not easy!) just to assess the science part."*

The first evaluation question was framed to illuminate how the process of planning this type of workshop can influence or shape the practice of those who are engaged in this work. The formative evaluation will use reflective practice and engage the organizers in individual reflection at the end of the planning process.

---

[1] Any quotes are from either participants in the workshop or the project team, depending on where the illustrative quotation falls in regards to evaluation question.

Determining the value of a literature review is challenging. The reviews are, first and foremost, of primary value to those doing the review. For this project, the literature review is envisioned as providing greater value beyond the scope of the project and therefore deserves more prominence in the proposal evaluation. In order to answer the second question "What is the value of the literature review by those most in positions to use it?," the evaluation will incorporate a usability study of key audiences which will include perceptual and intention measures of these key audiences. The key audiences will include workshop invitees who are, necessarily, important readers and beneficiaries of the review.

The third question is a more traditional conference evaluation inquiry: To what degree did the conference satisfy the participants related to building the framework? As this is a working conference, the concept of satisfaction is based in change in the participants through their engagement in the Workshop. A traditional post-conference measure was used incorporating multiple affect, awareness, and intention measures. The instrument was implemented by the conference coordinator before the final session of the workshop.

The final question is the summative question for the project. The summative (accountability) evaluation examines the potential for impact from the development of the framework on the field. For this evaluation, a purposive sample of experts across disciplines, selected for participation in the workshop, will be identified who will respond to the framework in terms of usability, potential use, potential value, and potential impact.

Table 1: Evaluation plan

Evaluation Question	Outcome	Indicator	Method	Impact	When Completed
1. Change in the organizers	Organizers are aware of positive change as a result of engagement	Reflective practice both individually and as a working group	Process evaluation using individual and group reflection	Each individual will describe at least two areas of growth and change	At end of Workshop
2. Potential value of literature review & key papers identified	Completed and useful literature review	Perceptions of workshop participants and referent leaders in the field	Survey: on line questionnaire	85% of respondents will describe and report positive applications	At completion of Workshop

3. Change in the participants	Participants in the Workshop are champions for the framework	Change scores and narrative from workshop participants	Post-workshop measures including retrospective pre- affect and intention scales	100% of participants will report and describe areas of growth and change	After the Workshop
4. Impact on the field	The framework is a valuable resource for educators and educational materials developers	Usability, perceptual, and value measures from purposive sample	Web-based questionnaire incorporating flash technology	75% of experts across fields and disciplines perceive the framework as functional, valuable, and potentially widely used	One year after the Workshop

The evaluation was completed following the dissemination of the Framework.

Findings

Satisfaction with the workshop

In terms of satisfaction with the workshop, the scores were very strong with low standard deviations. The workshop was clearly seen as important for the field of EE with a mean score of 6.73 (out of 7) and a small standard deviation of .647. The workshop also clearly enhanced participants' understanding of environmental literacy ($\bar{x}$= 6.73, SD=.437). The workshop appears to have been strongly regarded in terms of process, structure, and outcomes by the 11 responding participants. In terms of individual engagement, the strongest level of agreement was with the statement "I had a chance to share my perspectives" with a very strong mean of 6.82. Contribution to the discussion in the workshop ($\bar{x}$ =6.73), organizers listened to participants ($\bar{x}$= 6.64), facilitation allowed for appropriate input ($\bar{x}$= 6.56) and structure for the workshop was appropriate for getting input ($\bar{x}$= 6.55) were all over 6.50/7.00 mean scores with deviations under .700. Other items in the scale indicate strongly positive agreement, though a little less clear than for the first set of elements: length of sessions was appropriate ($\bar{x}$= 6.45), framework will provide

clearly for environmental literacy assessment (x̄= 6.36), and "I contributed to the outcomes of the workshop" (x̄= 6.27)(Table 2).

Table 2: Means and deviations satisfaction with workshop

	Mean	Std Dev
I had a chance to share my perspectives	6.82	0.60
I contributed to the discussion in the workshop	6.73	0.65
I contributed to the outcomes of the workshop	6.27	1.10
The organizers listened to participants	6.64	0.50
The facilitation allowed for appropriate input	6.55	0.69
The structure of the workshop was appropriate for getting input	6.55	0.69
The length of the sessions was appropriate	6.36	1.03
The framework will provide clarity for environmental literacy assessment.	6.72	0.47
I had a chance to enhance my understanding of environmental literacy	6.73	0.65
The workshop was important for the field of EE	5.91	1.38

Participants in the workshop intentionally were a diverse group including formal environmental educators, academics, informal environmental educators, science educators, social studies educators, assessment experts, and others. As a group, these individuals felt included in the process and that their ideas were heard. The most common comments offered by participants were that at the time of the workshop, the framework had breadth, but not necessarily the depth needed. Additionally, comments suggested that there needed to be increased clarity around constructs in the framework. As one participant explained: "I think we pointed out the areas of the framework and background info that require clarification (certain definitions, etc.) but overall, yes it encompasses the important components of EL and there is coherence among the components." Another noted how participants' opinions served the process by stating "During the workshop, great care was taken to bring clarity where it was called for." Even so, there were concerns that "some of the constructs [were] still not clearly defined and differentiated."

Expectations for the workshop

Participants were mixed in terms of how they felt expectations matched what occurred in the workshop. There was clear agreement that the process worked. As one participant wrote, the workshop "Exceeded my expectations. Impressed with the amount that we were able to cover/discuss with a considerable amount of depth/detail." Another comment also reflects this exceeding of expectations with the comment "My expectations were exceeded. The probing questions and the thoughtful discussion was excellent (ibid)."

Another cluster of comments related to being satisfied, but not exceptionally so. One noted surprise by stating the workshop was: "About what I expected. The process worked better than I expected" and another entered thinking: "I wasn't sure what to expect. I guess I was concerned I didn't have the requisite expertise for parts of the discussion…but in the end I felt like I actually had more to contribute than I thought."

There were a few participants who, though they felt the workshop was satisfactory, were unsure about the process going forward. One stated: "It's a little unclear how our input will be used by the project team" while another felt "My expectation is that the participants would be more involved in actually finding solutions to issues raised rather than just raising the issues regarding the draft. That was not the case but it didn't matter once I understood the objectives."

Perceptions of value of the framework

The workshop also appears to have met its intentions related to outcomes from the participants. Even with the small N, there were statistically significant differences in pre to post scores as measured using a post- with retrospective pre using a nonparametric paired-t test. All pre-scores were positive, and were strengthened through the workshop. Participants' strongest gain scores were in understanding environmental literacy through the frame of environmental education (gain score = .91, p=.33), understanding literacy from the perspective of other disciplines (gain score =.82, p=.011), and being satisfied with the assessment framework (gain score = .83, p=. 052). The latter of these is not significant at the .05 level, but given the small N, it is common convention to use .10 as the determinant of significance, in which case all gain scores were statistically meaningful. Seeing the framework as needed by the field (gain score = .76, p=.012) was an important, desired outcome from the workshop process related to the goal of positive change within the workshop participants (Table 3).

Table 3: Pre and post means and gain scores (paired-t)

	Pre x	Std Dev	Post x	Std Dev	Difference	p
The assessment framework is needed	5.91	1.22	6.64	.67	.76	.012

by the field						
The assessment framework satisfies my needs	4.50	1.08	5.33	1.00	.83	.052
The assessment framework will be important for Environmental Education	6.09	1.04	6.73	.65	.64	.026
The assessment framework will be important for other disciplines	4.73	1.56	5.45	1.04	.72	.024
The assessment framework will be useful for educators	5.36	1.36	6.00	.77	.64	.026
The assessment framework will be useful for policy makers	5.09	1.45	5.64	1.36	.55	.111
I am familiar with the work of environmental education	5.55	1.37	6.09	.94	.54	.052
I understand environmental literacy from the EE perspective	5.27	1.56	6.18	.87	.91	.033
I understand environmental literacy from other disciplines' perspectives	4.73	1.19	5.55	1.13	.82	.011

Changes in the participants

Two of the overarching goals of the workshop and the framework were that participants in the workshop were or would become champions for the framework, and that the literature review developed for the project was seen as complete and useful. The literature review was completed prior to the workshop. Participants in the workshop found the literature review of value as they very strongly agree that they plan to use the review in the future (x=6.45/7.00, Std Dev = .82). In addition, they plan to share the literature review with others (x=5.91, Std Dev = 1.38). They are far less likely to use the literature review in classes with a slightly negative mean of 3.67 which had a very high standard deviation of 2.35, suggesting bi-modality (Table 3) which relates to the reality of those who teach versus those who do not. Further, additional references were provided to the project team by the participants to ensure a deep, well-rounded product.[2]

The literature was noted by participants in the workshop as being a valuable resource. One respondent noted: "…the wisdom of the field was repeated in the literature and research that was cited and is apparent in the resulting framework." The desired outcome as

---

[2] From discussions with the PI regarding outcomes from the project.

identified in Table 1 (page5) was met: all respondents described and reported positive applications of the literature review.

Regarding serving as champions for the assessment framework, there was tremendously strong support for the assessment framework itself ($\bar{x}$=6.64, Std Dev=.81). Participants are also more likely to *share* the assessment framework (x=.645, Std Dev=.69) than to use the framework, which also had a very strong level of agreement (x=6.09, Std Dev=.83)—this makes sense as individuals are in various positions related to appropriate use of the framework.

Table 4: Means and deviations, intentions to act

	Mean	Std Dev
I will share the literature review included in this document with others	5.91	1.38
I plan to use the literature review included in this document	6.45	.82
I will use the literature review included in this document for classes	3.67	2.35
I support the assessment framework	6.64	.81
I will help implement the assessment framework	5.18	1.66
I will use the information from the assessment framework	6.09	.83
I will share the information from the assessment framework	6.45	.69

In looking at a histogram, there does indeed appear to be multimodality, but for use of literature review in classes, the modality is three-way, with a mode at 1, a mode at 4, and a mode at 7. This clearly reflects the different professional roles of the participants as those who do not teach, or only teach occasionally would have scored this as a 1 (strongly negative) or a 4 (neutral). The other item with a slightly elevated standard deviation, I will help disseminate the framework, had modalities at both points 5 and 7, with a larger tail to the negative (Figures 1&2).

Figures 1 & 2: Distribution on multi-modal responses
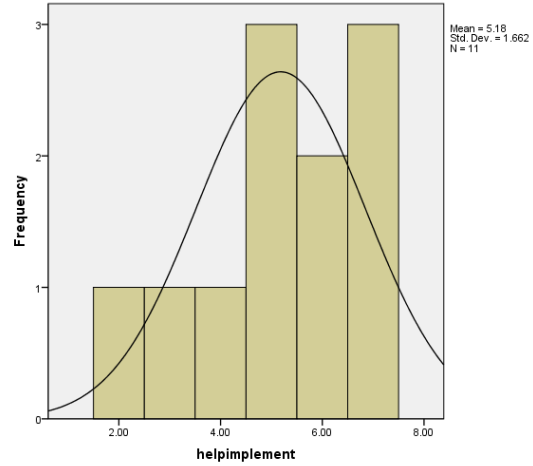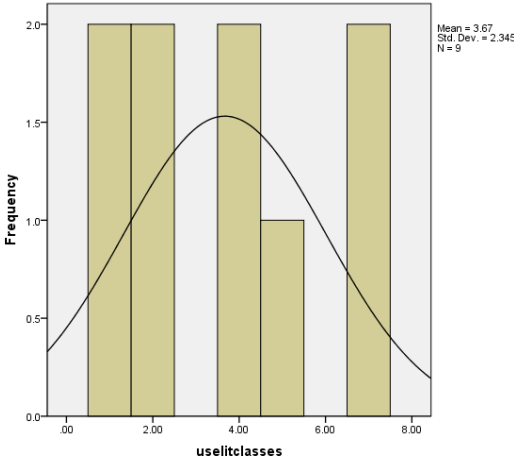
What the workshop participants gained from the workshop was, in the word they used most often, "clarity." They felt they left with "a much deeper and broader understanding of environmental literacy …. Distinguished from ecological literacy or environmental science literacy" and another noted "a greater understanding of the complexity of trying to assess environmental literacy—even more so than I have before."

> *A deeper appreciation for the substance and promise of environmental literacy. A great respect for the farsightedness of the early pioneers in EE.*

There were three trends in the data for what the participants felt they would take away personally and professionally from engaging in the workshop. The first, was an understanding of the elements of environmental literacy. Whether it was "A greater understanding of the complexity of trying to assess environmental literacy" or "clarity on components that are critical to defining and measuring environmental literacy," some of the participants felt a "deeper appreciation for the substance and promise of environmental literacy." For one participant, the appreciation extended to "driving me to think about …how this can be used for the audience I work with."

A second trend was that of the "complexity of framework development and how it is used to create assessments." One participant noted "I was able to see a piece of the puzzle in terms of framework development that was previously unknown to me." Another felt it was "useful to know more about how educational assessment is done and how environmental literacy is defined."

> *I gained a greater appreciation for the history and evolution of this effort and the research that supports it.*

The third trend was culled from a few participants' comments regarding the cross-disciplinarity of the workshop. Being able to understand "environmental literacy especially as distinguished from ecological literacy or environmental science literacy" was noted by one. Another participant valued the "connections with colleagues in various fields/agencies" and how their discipline "intersects with EE." There was perceived value around the "confidence I can communicate across discipline and boundaries."

Two comments did not fall into trends, but do warrant inclusion. For one person, there was tremendous value in gaining "A great respect for the farsightedness of the early pioneers in EE." For another participant, the value is in being able to share "the framework and background information with my colleagues."

One participant left with "a feeling of confidence that I can communicate across discipline and boundaries."

Critical components in assessment

When asked what the most critical components to environmental literacy assessment are in the early part of the 21st Century, the dominant responses revolved around behaviors. There were basically two themes. The first, is the tools themselves, and the second is components including competencies, knowledge, and dispositions.

The tools are needed to operationalize "ways to assess dispositions/attitudes and behaviors so we can ask questions about the relationship between disposition, science content knowledge, and behavior." Some of the participants felt there is a "pressing need to improve instruments/tools for measuring behavior" and a need for "understanding/evaluating issues from multiple and interesting perspectives… dispositions."

For several, the most "crucially needed (urgently needed) component is related to competence." Several of the participants simply wrote "competencies," "knowledge," and/or "dispositions." Competencies were seen as necessary for "understanding the components that contribute to ERB."

Do people understand the role of the environment in their daily lives? Do people see the connections between social and ecological systems? Are they able to act in a way that will sustain the functions of our social and ecological systems?

A subtheme of the competencies is that of critical thinking. As one participant wrote: "It's critical for people to think about what environmental literacy is in order to understand why it is important and how

to promote it." Others noted the importance of "The abilities of citizens to respond with critical thinking and reasoning" for citizens to be "able to understand and act appropriately."

Longitudinal perspectives of participants

A year following the workshop, a follow-up questionnaire (web-based) was sent to the participants. Of the 11 participants, 8 responded (72.7% response). There were two goals in this longitudinal component; the first was to determine the stability of changes in participants in this type of workshop. The second was to determine a proxy measure for the goal of dissemination and use.

Of the seven who responded to the question asking if they had seen the completed framework, five (71%) noted that they had.

Regarding stability of changes, four key questions from the workshop feedback form were repeated. There are significant limitations in interpreting these data. The N of 11 from the workshop is a very small number; having it reduced to 8 suggests strong caution in interpretation. Second, the respondents to the follow-up may not be more or less like those who did not respond and data cannot be tracked to the respondent from the post-workshop feedback to the year-out data due to the anonymity of the feedback process.

Even so, all four statements remain tremendously high (6.00 and above on a 7 point scale), but only one item had a slight gain: the perception of these respondents to their contributions to the outcomes of the workshop went up .23 points and had a much smaller deviation. The largest decay (.73) was for the item related to enhancing knowledge of environmental literacy. Clearly, respondents still see the workshop as having been structured appropriately to get input and the believing the framework will provide clarity for environmental literacy, but there may have been a slight halo effect from the workshop in the original feedback.

Table 5: Comparison of means and standard deviations on four key questions

	Post wksp Mean	Std Dev	Stable Mean	Std Dev
I contributed to the outcomes of the workshop	6.27	1.10	6.50	.55
The structure of the workshop was appropriate for getting input	6.55	0.69	6.00	.63
The framework will provide clarity for environmental literacy assessment.	6.72	0.47	6.33	.52
I had a chance to enhance my understanding of	6.73	0.65	6.00	1.10

environmental literacy					

The participants responding had generally positive comments regarding the framework. One noted it is "A well researched and clear document that will guide those interested in developing environmental literacy measures." Another sees it as "a powerful framework that would have been a great basis for the PISA work had it gone forward. I hope it is used in other ways." Another noted "translating the importance of the competencies to others can be difficult at times. The notion of competencies and how they interact with knowledge, dispositions, etc. is not well understood in the field in general, especially by those who are not steeped in the literature on assessment."

Nine items were included in a post- with retrospective pre in the workshop feedback. Those same nine items were used in the longitudinal measure. There were positive gain scores for all but one item in the longitudinal measure, and that item, the assessment will be/is important for other disciplines, had no change though the high standard deviation would suggest potential modality might exist in a larger population. Table 6 shows the means, standard deviations, and gain scores for the longitudinal data, collected one year post workshop. It is interesting to note that the final two items pre/post comparisons reflect the composition of the group as being slightly weighted toward environmental educators or those who know the field of EE.

Table 6: Retrospective pre and one year out means and deviations

	Pre x One year out	Std Dev	One year out x	Std Dev	Change
The assessment framework is needed by the field	6.17	1.33	6.67	.52	.50
The assessment framework satisfies my needs	5.83	1.47	6.33	.82	.50
The assessment framework will be/is important for Environmental Education	6.50	.84	7.00	.00	.50
The assessment framework will be/is important for other disciplines	5.50	1.22	5.50	1.87	0
The assessment framework will be/is useful for educators	5.50	1.05	5.83	.75	.33
The assessment framework will be/is useful	5.50	1.22	6.50	.55	1.00

for policy makers					
I am familiar with the work of environmental education	6.00	1.26	6.67	.52	.67
I understand environmental literacy from the EE perspective	5.83	1.33	6.67	.52	.84
I understand environmental literacy from other disciplines' perspectives	4.83	1.17	6.00	.89	1.17

N=8

To determine the stability of these perceptions, the retrospective pre and post means for both the workshop feedback and the year-out follow-up were compared. All but one item had higher post measures 1-year out than following the workshop. The item that did not have a higher post-measure was the usefulness of the framework for educators. There was still a gain from both retrospective pre perceptions to point in time of measurement. It is also important to note the inflation of pre-positions in the year out. This could be explained by several factors including who responded of the original 11, but also could be explained as a function of having been through the workshop and time compression to rethink how one truly felt a year in the past.

With fewer than 10 respondents, no statistics were run for significance or comparative purposes. As above, there does appear to be an entry bias toward respondents who understand environmental education.

Table 7: Comparison of retrospective and post workshop/1-year out means

	Pre x	Pre x 1 year	Post x	Post x 1 year
The assessment framework is needed by the field	5.91	6.17	6.64	6.67
The assessment framework satisfies my needs	4.50	5.83	5.33	6.33
The assessment framework will be important for Environmental Education	6.09	6.50	6.73	7.00
The assessment framework will be important for other disciplines	4.73	5.50	5.45	5.50
The assessment framework will be useful for educators	5.36	5.50	6.00	5.83
The assessment framework will be useful for policy makers	5.09	5.50	5.64	6.50

I am familiar with the work of environmental education	5.55	6.00	6.09	6.67
I understand environmental literacy from the EE perspective	5.27	5.83	6.18	6.67
I understand environmental literacy from other disciplines' perspectives	4.73	4.83	5.55	6.00

An important outcome for the project was the use of the framework. Using the individuals who had engaged in the process as a proxy measure for potential use, respondents noted the frequency with which they engaged in potential actions related to the framework. The strongest action was that of sharing information from the assessment with others. All six of the respondents to this question have done this at least a couple of time with three of them continuing to do this. All the respondents have also helped disseminate the assessment framework, with four of them doing this at least a couple of times or more. Three of the actions have had five of the six respondents doing them at least once: using information from the assessment in their work; sharing the literature review with others; and using the literature review in their work. None of the six respondents had used the literature review in any of their classes and given the original composition of the participants, it is probable that at least several of these respondents do not teach classes. Table 8 shows the frequencies of each of the actions by these respondents.

Table 8: Frequencies of actions related to the framework

	Not at All	Done this once	Done this a couple of times	Done this several times	Continue to do this
Share the literature review included in this document with others	1	0	3	0	2
Used the literature review included in this document	1	2	0	0	3
Used the literature review included in this document for classes	6	0	0	0	0
Helped disseminate the assessment framework	0	2	1	1	2
Used information from the assessment framework in my work	1	1	1	0	3
Shared information from the assessment framework with others	0	0	3	0	3

Respondents were asked who they felt should be aware of the framework, and why. Of the six respondents who offered comments, four felt those involved in environmental education in various ways were the dominant audience. One saw it as "anyone involved in environmental education because [the framework] is a strong tool to show what is important around the construct of EL." This sentiment was echoed by another comment: "Anyone teaching about the environment, sustainability, or any form of EE." One respondent started with EE, but expanded the target recipients: "Pretty much every practitioner, provider, policy maker and researcher involved in EE. In addition, I believe that this needs wider distribution to the general education and environment audiences." Others included "researchers interested in environmental education, organizations that engage in environmental education, anyone involved in assessing environmental literacy." The use of the framework by environmental educators was advocated by one respondent who felt environmental educators should be able to use the framework "to help articulate the goals of EE."

A couple of comments more broadly spoke to a wider array of educators and "those involved in setting education standards." Another included "faculty at colleges/universities; those involved with curriculum development; those involved with development/implementation of environmental literacy plans." The focus on the assessment framework was clear for the respondent who noted "Anyone in any discipline working on an assessment framework." A similar educational policy focus seems to lie behind a third respondent who felt the audience should be "State level decision-makers within education departments."

The environmental literacy focus was the orientation for two respondents: "Educators, managers, administrators, policy makers and assessment specialists associated with programs designed to increase environmental literacy," wrote one while the other noted "Government, environmental NGOs, and businesses related to the environment should also be aware of the framework. It will help them to create policies related to environmental literacy, to connect with constituents, and potentially tailor their environmental business to EE markets."

The respondents were also asked who should be using the framework and why. Three of the six responding to the question noted the "same as above," "see above," or "all the above" and one commented "because it reminds people of aspects of education that they might overlook, and provides a small measure of standardization that could make it easier to compare different samples."

Similarly, other comments listed specific audiences and explained the use of the framework for the audiences:

- "Educators and administrators in formal and non-formal educational settings where EE is a component. "
- "Assessment specialists who need to design instruments to measure environmental literacy."
- "Government and NGOs should also be using it for outreach materials and potentially policy issues."
- "Educators, manager, administrators who oversee or are designing programs that are designed to increase environmental literacy. Framework provides an overview of what such programs need to consider."

One respondent felt it was important to be widely distributed as "This could potentially be the cornerstone of what EE looks like in the future because it helps us really understand what is being taught and what is being learned."

Project Team

The core team is an important source of data to understand both the process, and the ultimate products of the project. In general, the team felt the work they did was collaborative and productive. In the interviews, and in listening to team conversations during the project, the respect for each other and the willingness to hear and even seek out varied positions was obvious.

The challenges for the team during the project, and leading into the workshop itself, were around the conceptualized distinction between framework for specific assessment e.g. PISA 2015 and more generalized use of the framework. As one team member noted in reflection: "…it was necessary to have an overarching framework to address different audiences. We knew that different products in the end would be very useful because that allowed us to sell products to different audiences." To get there, challenges emerged early in the process that had to be addressed. "It took all of us a long time to do two things; 1) get beyond initial perceptions and perspectives based on experiences; 2) get our heads around what it was we were doing and what we were trying to come up with. There were, ultimately, a "number of issues we had to work through we didn't anticipate at the beginning of the project." "We have time and a good team" was the thought going into the project. However, the differences among the team members "reflect or led to some of the chaffing points of where there were substantive disagreements we had to talk and work through. There were also the strengths individuals brought to the discourse and the project over time. "

The tension between the products appears to have been a continual discussion. Several times in the discussion, and from different triggers, the challenge was brought up. When talking about there having not been an assessment framework in the field before, the following comment emerged: "We struggled with the tension implicit in those two things—

a very broad product applicable to different audiences and a piece applicable to specific audiences. Both products reflect well on that tension." At another point in time, more specificity was given to a variation on the tension as the comment was shared: "A major challenge was the degree of specificity of the framework—would it serve as a framework for the larger field, or would it best serve as a specific product e.g. for PISA?"

There were other issues the team had to work through that the team "didn't anticipate at the beginning of the project" when they felt "we have time and a good team" and therefore can address any issue. One of these issues had to do with an "ongoing tension of behaviors representing EL and the team accepting that as important element—but also asking how are we going to assess that in national/international assessments? How do we resolve that while still honoring the fact that behaviors are important and a defining characteristic in an assessment? Second was a number of different components of EL—number of not scientific elements e.g. attitudes, behaviors, LOC, competencies—what are you really going to assess and what can you develop scales for within an assessment given you can't assess everything. What type of direction do we give people who will use the framework? They can't pick and choose pieces if we want consistency and coherence around the major concept of EL." A third issue related to "expectations of our audience. Just as we had to come to grips with what we were doing and what the products would be in a concrete way, the number of people who thought we would be producing a test they could give was huge."

> *Overall, few professionals in the field have ventured into this arena before. We're not familiar with the modes of thinking and the procedures associated with the development of a framework. Roger made that eminently clear—the framework is guidance for developers of specific assessment.*

The means by which the team moved through the initial challenge was by having the voices from the science assessment community help shape the discussion. In an interesting exchange about how the team moved through, the following four comments occurred in very close sequence: "Pablo helped us get there." And then "Roger should take credit for leading that part too." Another added "I think it took the whole team and a fourth comment was offered as an explanation: "this is an example of the group trusting people with different elements of expertise. People knew they couldn't do everything themselves. We even broke up into specific tasks. Sub-committee discussions were very helpful along the way."

Because "what we tried to do was very broad based, it developed as we kept going into it." The developmental process necessitated a "certain amount of agreement to disagree and move forward. "   Part of challenges the team had to work through were determinations of "how much of the document should be oriented toward defining domain and how much

oriented toward laying out guidelines common to assessment frameworks." The team did find there were "differences in opinion over time re: how much [the] document/project should focus on." For some on the team, they had "Never wandered into this in the field before."

One of the reasons the team did not start with a unified goal was that the "field [EE] is so preoccupied with EL frameworks in language of assessment/exercise in defining the domain, we put our thinking in that area" suggesting that the field as a whole was more focused on conducting assessments and the team members coming

> I found myself moving from chair of conference calls and PI to trying to step back and look at whole thing as a learning experience for all of us. Wearing my educator's hat, I was looking at where are we and what do we need as a group to keep learning and moving forward. I kept finding myself putting on those different hats: where we are, what we need to keep moving and not get bogged down.

from the EE perspective entered the conversation with a preconceived notion of what it could/should be that was different from the reality of the process and product. Continuing the thought, the team member reflected "The flip side is that no one's attempted to draft an assessment framework in the field before. We were stepping into a new landscape."

Throughout the discussion, on calls, and when sitting together, the team clearly did function as a whole. Even with the challenges, the team "had to work through that and did that as a team." Members of the team "Give Karen credit for that" and note that one "part was trusting Karen's leadership; trusting the process itself as unfold would become clearer as it went along" and, for the team, it did. Another felt that "Karen's leadership in maintaining discipline and leadership is key" to the productivity under pressure and the final products that emerged from the process.

The workshop was an important component of the process, but a component for which the issue was "one of timing—we really didn't have a clear idea of the product at that point of time. It was a detail that evolved. We agreed we didn't want a finished product." The product that went to participants was "unfinished and there were gaps." But the workshop served its purpose as some of the "comments were helpful in identifying what those gaps were and what we needed to add to document and shift to appendices." Because of the workshop, it is "quite a different document now." For the workshop it was made clear that "the people who develop the document have a propensity to want to counter arguments and recommendations and defend what they've done. Karen's leadership had all of us observe and listen and clarify but not step in and argue. That contributed substantially" to the positive outcomes from the workshop. The team agreed to clearly defined roles for the

workshop, and a great deal of time was spent "identifying participants. There was intentionality in the diversity of who was invited to attend."

For the team, the workshop was "worth it." The project "had responsibility for completing framework for PISA—and the workshop did change the product. We went through line by line and took comments specifically for PISA and made adjustments to the document. Rejected one or two but for most part accepted and it improved the document." The workshop led the team to add specificity and definition which resulted in an "increased usability of the document."

In reflecting across the project, team members believe it's "important to the field to have something like the most current conceptualization of EL." "Instead of pieces," commented one team member, "I think we pulled it together." Individually, members of the team also benefited from engaging in the process. Some of the benefits are "the kind of new insights one gets when one works intensively with new people with different ideas. Outside this, we'd never have worked this intensely together before."

Conclusions

The **primary outputs** for this project were the workshop, the literature review, and the framework for assessment of environmental literacy. In terms of producing those outputs, the project clearly was effective. The quality of the products and the quality of the process leading to these outputs does, however, have qualitative components and thus to understand the outcomes of the project, more specific process and use questions are necessary. Thus, the summative evaluation was framed on four large questions:

1. In what ways did the planning process affect the understandings and beliefs of the Organizing Committee?

The desired outcome of organizers being aware of positive change as a result of engaging exceeded its impact level: organizers described many more than two areas of growth and change each.

The organizing committee emerged through this project and process as a team that honored each other, honored and valued differing perspectives and disciplines, and treated (and continue) to treat each other with respect and compassion. The depth of learning by the team regarding the framework, the components of literacy and environmental literacy, and the complexity of attempting to frame such a complex construct is tremendous. The products resulting from their work are seen as useful and of value to those in the field.

2. What is the value of the products by those most in positions to use it?

The desired outcome of having participants serve as champions for the framework was met. All participants reported and described areas of growth and change.

Although initial thoughts were that the literature review would be used for university classes, the real use of the literature review is by professionals (academics and practitioners) in their own work and in sharing with colleagues. The use of the framework, likewise, is seeing its potential use in individual consideration of practice, and as of yet is not serving for assessment construction, though that will likely occur.

Participants in the workshop reported fairly consistent use of products of the project, some using the products routinely in their work.

3. In what ways did the Workshop, through the work of building the framework, change the participants?

The desired outcome of participants in the workshop being champions for the framework was met with 100% of participants reporting and describing areas of growth and change was met.

Participants in the workshop were very supportive of, and identified a commitment to being champions of the assessment framework. Further, the workshop facilitated participants gaining new insights into cross-disciplinary understanding and dialogue.

Participants felt the workshop was important, useful, and productive. Many entered the workshop not knowing what to expect or with expectations of a different type of experience. All left the workshop with a positive orientation toward the project, the work of the project, and the products. These orientations remained strongly positive a year out from the workshop.

4. How do experts describe the effectiveness of the Workshop in providing a useful framework for the field?

The desired outcome of the framework being seen as a valuable resource for educators and educational materials developers was exceeded with all participants representing the array of disciplines and fields saw the framework as functional and valuable with potential for wide use.

The entire process of building the framework for the assessment of environmental literacy was necessary for the resulting products. The triangulated data sources clearly suggest the process was vital in producing a useful, and resonate framework for the field. Anecdotal data shared by team members of ongoing efforts and unanticipated outcomes from the framework process and the framework itself indicate that the important foundational work of the project was not just met, but exceeded.