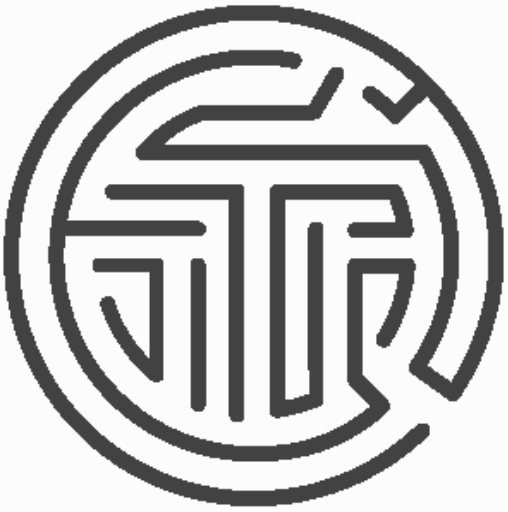
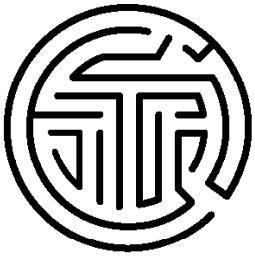


FORMATIVE EVALUATION OF THE INTEL® SEEING REASON SEMINARS (U.S.)

SUMMARY REPORT

CENTER FOR CHILDREN & TECHNOLOGY



CCT REPORTS
FEBRUARY 2004

FORMATIVE EVALUATION OF THE INTEL® SEEING REASON SEMINARS (U.S.)

SUMMARY REPORT

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INTRODUCTION

During the summer and fall of 2003, Education Development Center's Center for Children and Technology (CCT) undertook a formative evaluation of *Seeing Reason: Mindful Mapping of Cause & Effect*, an Intel Teach to the Future professional development seminar. Intel's seminars are designed to introduce teachers to software tools that they can use to support their students' inquiry and research projects. This formative evaluation examined a pilot test of this professional development format, which specifically focused on the Intel in Education online causal mapping tool *Seeing Reason* and resources associated with the tool.

About the Seeing Reason seminar

Seeing Reason: Mindful Mapping of Cause & Effect is the first in a series of planned professional development seminars being developed as "follow up" trainings targeted to Lead Educational Agencies (LEAs) and Master Teachers (MTs) who have already participated in the Intel Teach to the Future program. The seminars use a train-the-trainer model, recruiting MTs from Intel Teach to the Future to participate in the seminars, which they then commit to delivering to ten teachers each in their home school districts. The *Seeing Reason* seminar curriculum uses many of the same features as the 40-hour Intel Teach to the Future curriculum, such as collaborative exploration of the new software, group discussions, and the creation of lesson plans, to engage teachers with the online causal mapping tool, *Seeing Reason*.

As described on the Intel Innovation in Education web site, *Seeing Reason* is "a classroom workspace for investigating cause and effect relationships in complex systems. At the heart of *Seeing Reason* is an interactive mapping tool that helps students map relationships and construct models of their understanding."[1] Seminars are intended to invite teachers (from upper elementary to high school grades) to learn strategies for using this tool to guide project-based, inquiry-oriented learning experiences for their students, and to develop activities that use this online causal mapping tool to support student investigations of topics that include cause and effect relationships. More broadly, the seminar is intended to be a professional development opportunity that increases teachers' ability to use technology effectively to support student learning. Seminars are six to eight hours long, and delivered by Senior Trainers to MTs, and then by MTs to teachers in their home school districts. Senior Trainers and MTs are experienced facilitators with backgrounds in classroom teaching, school leadership, and effective technology integration.

The Institute for Computer Technology (ICT) and the Intel Corporation prepared the curriculum for the Intel *Seeing Reason* seminar. Both the MT and Participant Teacher (PT) Curriculum books (Version 1.0) follow the same two-module sequence:[2]

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[1] Information about Seeing Reason, Mindful Mapping of Cause and Effect, can be found online at: http://www97.intel.com/scripts-seeingreason/index.asp. The Seeing Reason mapping tool was adapted from an application developed by the Center for Innovative Learning Technologies (CILT) <http://www.cilt.org>.

[2] This curriculum has been revised, but because this report refers to trainings delivered using the original curriculum, we include an outline of that version.

MODULE 1: INTRODUCING AND PLANNING A PROJECT THAT USES CAUSAL MAPPING	
Activity 1 –	Introducing Yourself
Activity 2 –	Introducing Causal Mapping
Activity 3 –	Getting Started
Activity 4 –	Planning Your Project
MODULE 2: CREATING A LESSON THAT INCORPORATES THE SEEING REASON TOOL	
Activity 1 –	Setting Up a Seeing Reason Project
Activity 2 –	Creating a Practice Causal Map
Activity 3 –	Collecting Research to Support Your Project
Activity 4 –	Sharing Causal Maps and Practicing Effective Questioning
Activity 5 –	Evaluating Your Project and Practice Causal Map
Activity 6 –	Creating an Assessment Plan
Activity 7 –	Planning Implementation and Revisiting your Lesson Plan
Activity 8 –	Evaluating the Seminar
APPENDIX	
Appendix A –	System Requirements
Appendix B –	Cause and Effect Relationships *
Appendix C –	Sample Project Ideas
Appendix D –	Sample Project – Guiding and Cause & Effect Investigative Questions
Appendix E –	Walkthrough: A Project Example
Appendix F –	Mapping Student Minds
* This Appendix page is only in the Participant Teacher curriculum book.	

As outlined above, the curriculum focuses on building teachers' understanding of cause and effect relationships, guiding participants through the process of planning their own project, learning how to use the Seeing Reason online tool, creating an assessment plan, and developing and revising an implementation plan. The training also addresses pedagogical and classroom management challenges associated with using the online tool with students.

About this evaluation

The goals of this formative evaluation of the *Seeing Reason: Mindful Mapping of Cause & Effect* seminar were to gain insight into the following:

- The strengths and weaknesses of this mode of delivery of professional development
- The quality and character of the reception of the seminar by both MTs and seminar participants
- Opportunities for, and barriers to impact on teacher practice and student learning for this seminar and possible future seminars

This report presents findings and recommendations based on data collected between August 2003 and January 2004.

Methods

This formative evaluation of the *Seeing Reason* seminar draws upon qualitative and quantitative data obtained through online surveys, interviews, site visits, email correspondences, and document analyses of curricular materials created by Intel and ICT.

Online surveys

From August – December 2003, CCT conducted two end-of-training surveys – one for MTs, and one for PTs. These surveys, which were placed online by Intel (using Zoomerang), were delivered to MTs and PTs at the end of *Seeing Reason* training sessions and referenced in the curriculum materials (See Module 2.26, Activity 8 of both the MT and PT Curriculum books, Version 1). The MT surveys collected information about whether teachers felt prepared to lead trainings and whether they planned to use *Seeing Reason* in their own teaching. The MT surveys also collected baseline data about MTs' own use of technology in the classroom. The PT surveys collected similar information, documented when locally-delivered seminars took place, and explored obstacles that teachers might encounter when using *Seeing Reason* in their classrooms (See Appendix A for the questions included in the MT and PT surveys and Appendix B for a full report of frequencies from End-of-training evaluations).

Interviews

Formal phone interviews with the eight Regional Training Agency (RTA) coordinators occurred during September 2003. These interviews explored RTA coordinators' perceptions about how the various types of trainings were received within the districts in which they worked, how these various forms of training were integrated into professional development offerings in these districts, and what type of feedback RTA coordinators received from MTs about the content and structure of the seminars. Follow-up email conversations were conducted in January 2004 with all eight RTA coordinators, in order to find out how the local implementation process was proceeding and to collect their perceptions regarding the relative effectiveness of this combination of training offerings for the districts they worked with, and the levels and causes of attrition they may have been experiencing.

Informal interviews and conversations took place with teachers (MTs and PTs), Senior Trainers, and district technology directors during site visits to schools, as well as during seminar training sessions. Interview protocols developed for MTs and PTs, administrators, professional development coordinators, and technology directors explored educators' backgrounds and positions at the schools, their views of the link between *Seeing Reason* and educational concepts, and their views on the effectiveness of *Seeing Reason* seminars as well as overall feedback and reflection.

Site visits

Site visits were conducted in three locations around the country: in one site during July 2003; in a second site during August, November, and December 2003; and in a third site during December

2003. Protocols for seminar observations focused on the structure, content and facilitation of the seminar; participants' involvement with, and response to, the training; and how teachers planned to use *Seeing Reason* in their classrooms. Observation protocols for site visit interactions with MTs, PTs, district administrators, and technology coordinators explored the school and classroom culture; how teachers and administrators talk about Intel Teach to the Future and the *Seeing Reason* seminar; how *Seeing Reason* was implemented in the classroom with students; what educators defined as some of the obstacles, struggles, or excitements related to implementation; and in what ways the concept of "cause and effect" was addressed in the curriculum.

The researchers observed two MT trainings and one PT training. During these visits, researchers observed trainer and participant involvement in the seminars, and had informal conversations with the trainers and participants throughout the seminar and during breaks. Additionally, one researcher also conducted informal interviews with approximately 14 MTs, observed one MT using *Seeing Reason* with two classes of high school students, had informal conversations with PTs attending a seminar, and attended a MT Advisory Board Meeting at one district. Field notes from the site visits were recorded and compiled, and key themes were identified.

Email was used to facilitate the location, logistics, and coordination of site visits and to follow up with Regional Training Agency (RTA) coordinators, MTs, and Senior Trainers who conducted trainings. Trainers' names and locations of seminar training sites and dates were provided by RTA coordinators, who also shared examples of what they called "exemplary *Seeing Reason* lesson plans" via email.

Summary of Findings

This section will discuss several key themes that arose in this evaluation, drawing on multiple data sources as evidence. Three interim memos summarizing seminar and Institute findings were submitted to Intel in September, October, and December 2003; this summary of findings draws partly upon the information presented in these memos. The summary includes the following sections: (I) Audience, (II) Responses to and perceptions of the *Seeing Reason* seminar trainings and tool, and (III) Local implementation of *Seeing Reason*. Discussion and Recommendation sections follow the Summary of Findings.

Audience

MT and PT trainings took place between August and December 2003 in schools in the eleven RTAs participating in this pilot: Arizona, California, Colorado, New England, Florida, Washington DC/Maryland, Oregon, North Texas, South Texas, Utah, and Washington. Survey data dated January 4, 2004 (including all reported *Seeing Reason* seminars that took place in 2003) demonstrate that 181 MTs and 462 PTs completed valid surveys.[3] Course rosters submitted directly to Intel by Master Teachers reflect seminar participation by 325 MTs and 933 PTs. This indicates a response rate of 51% (valid responses, MTs and PTs combined), or 63% if invalid responses are included.

3 These numbers are based on results obtained through the End-of-Training Seeing Reason Evaluation Survey as of the end of December 2003. Approximately 147 surveys were eliminated from the analysis because incorrect versions of the survey were completed.

Master Teacher profiles

Educators who participated in MT *Seeing Reason* seminar trainings teach and work across diverse subject areas and play multiple roles in their schools and districts. A summary of their areas of specialization is presented in Table 1 (teachers could check multiple categories). The large majority (75%, n=181) of respondents selected the "Other" category in response to this question and listed job categories including administration, all content areas, business, library/media, professional development, and technology integration specialist.

Specifically, respondents (n=181) identified themselves (choosing more than one subject area) in the following ways (listed in alphabetical order): Arts 4%, Bilingual education or ESL 3%, Computer science 28%, English/language arts 22%, Family and consumer science 0%, Foreign languages 3%, General curriculum 27%, Gifted 11%, Mathematics 18%, Music 2%, Physical education 3%, Religion 2%, Science 17%, Social studies/history 19%, Special education 4%, Vocation/technical training 9%; and Other 75%.

TABLE 1: MASTER TEACHER AREAS OF SPECIALIZATION (N=181)

MT Areas of Specialization	%
"Other"	75
Computer Science	28
General Curriculum	27
English/Language Arts	22
Social Studies/History	19
Mathematics	18
Science	17
Gifted	11
Vocation/Technical	9
Arts	4
Special Education	4
Bilingual Education	3
Foreign Languages	3
Physical Education	3
Music	2
Religion	2
Family and Consumer Science	0

MTs reported working across the full range of grade levels, including the lower elementary grades. Specifically, 38% report teaching lower elementary (grades K-3), 44% report teaching middle elementary (grades 4-5), 45% report teaching middle/junior high (grades 6-8), and 37% report teaching high school (grades 9-12). See Figure 1 for a full reporting (teachers could check multiple categories).

Teacher responses to the question of how long they have been teaching full-time ranged from four years up to 35 years, with a mean of 16 years of teaching. MTs were, on average, more experienced teachers than the PTs who participated in these seminars. See Table 2 for a comparison.

FIGURE 1: MASTER TEACHERS, GRADE LEVELS TAUGHT (N=181)

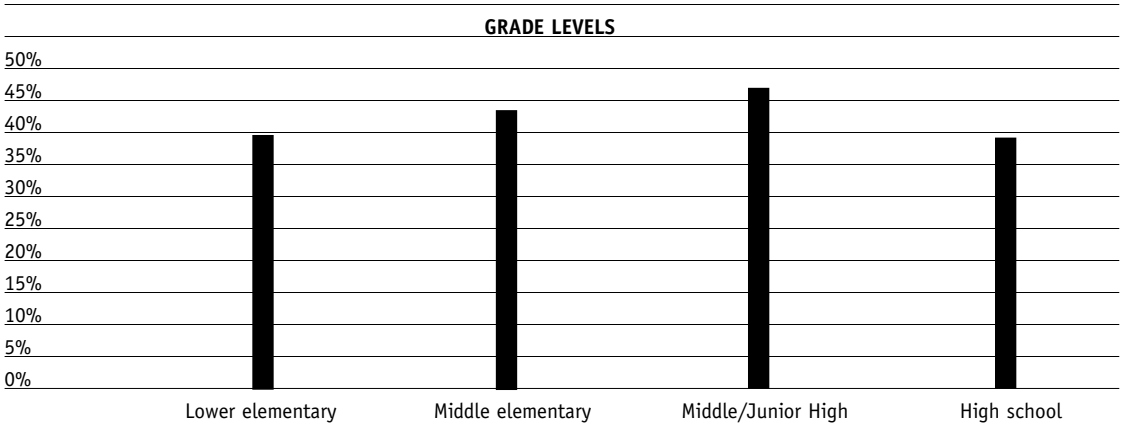


TABLE 2: MASTER TEACHER AND PARTICIPANT TEACHERS YEARS TEACHING EXPERIENCE

Years Teaching Experience	MTs (n=180)	PTs (n=457)
0-3	0%	16%
4-9	26%	23%
10-19	39%	33%
20+	35%	28%

Participant Teacher profiles

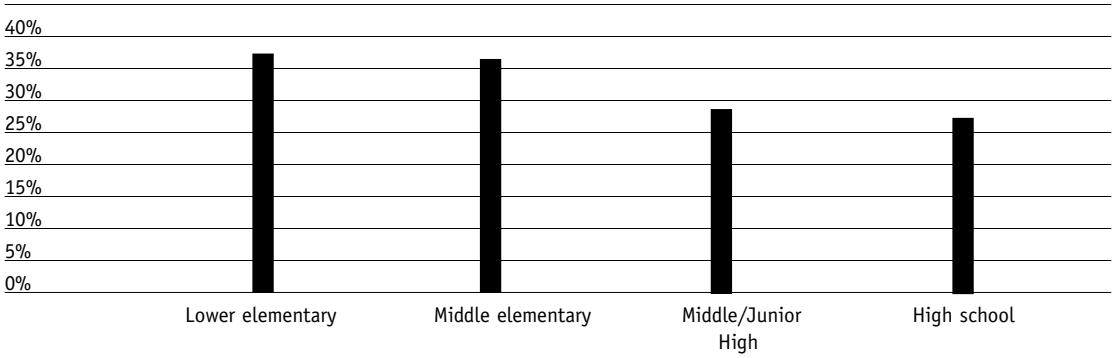
Educators who went through PT *Seeing Reason* seminars were also from diverse subject areas. A summary of their areas of specialization is presented in Table 3 (teachers could check multiple categories). The respondents (n=462) identified themselves in the following ways: Arts 6%, Bilingual education or ESL 9%, Computer science 12%, English/language arts 28%, Family and consumer science 2%, Foreign languages 4%, General curriculum 27%, Gifted 7%, Mathematics 22%, Music 4%, Physical education 3%, Religion 1%, Science 23%, Social studies/history 23%, Special education 10%, Vocation/technical training 4%. The largest group included those who identified themselves as Other (83%), and specified such categories as all academic areas, business, guidance, health, library/media, or technology integration specialist.

TABLE 3: PARTICIPANT TEACHERS' AREAS OF SPECIALIZATION (N=462)

PT – Areas of Specialization	%
"Other"	83
English/Language Arts	28
General Curriculum	27
Science	23
Social Studies/History	23
Mathematics	22
Computer Science	12
Special Education	10
Bilingual Education	9
Gifted	7
Arts	6
Music	4
Vocation/Technical	4
Foreign Languages	4
Physical Education	3
Family and Consumer Science	2
Religion	1

PTs reported teaching the following grade levels: 36% lower elementary (grades K-3), 36% middle elementary (grades 4-5), 28% middle/junior high (grades 6-8), and 27% high school (grades 9-12). (Teachers could check more than one response.) See Figure 2.

Figure 2: Participant Teachers Grade Levels Taught (n=462)



Close to 65% of the teachers who attended the PT *Seeing Reason* seminars had previously participated in the 40-hour Intel Teach to the Future trainings, while 34% had not. Teachers responded that they had been teaching full-time ranging anywhere from four years up to 47 years, with a mean of 14 years of teaching. See Table 2 for a summary and comparison to MTs years of teaching experience.

When asked if they had previously used a causal or concept mapping tool (like *Seeing Reason* or Inspiration™), 63% of PTs (n=462) responded that they had not, while approximately 36% had, either occasionally (27%) or many times (9%).

A majority of PTs had used online tools to support a variety of student activities and for their own work. For example, 76% reported that they had used online tools to create such things as a calendar for school events, rubrics, or online quizzes. Relatively few teachers (31%) had used the Internet to support student collaboration with others outside of the classroom (See Table 4).

TABLE 4: TEACHERS' PRIOR USE OF OTHER KINDS OF WEB-BASED TOOLS (N=462)

	Have done %	Have not done %
Used online tools to create such things as a calendar for school events, rubrics, online quizzes, etc.	76	23
Collaborated with other teachers to develop projects.	67	32
Developed a lesson plan using an online template.	61	38
Had my students use online tools to create such things as crossword puzzles, drawings, etc.	49	50
Had my students collaborate online with others on projects.	31	68

II. Responses to and Perceptions of the Seeing Reason Seminar Trainings and Tool

Evidence from training observations, conversations with teachers and survey comments consistently demonstrate that both MTs and PTs had very positive reactions to their *Seeing Reason* seminars and believed *Seeing Reason* could be very useful for their classrooms. Over 95% of the respondents who completed the MT survey would "probably" or "definitely" recommend the *Seeing Reason* seminar to a friend or colleague (18% and 78%, respectively), with only 3% indicating that they "probably" would not, and 0.6% indicating they "definitely" would not recommend the seminar. Similarly, close to 95% of the PTs who responded to the survey indicated that they would "probably" or "definitely" recommend the *Seeing Reason* seminar to a friend or colleague (25% and 70%, respectively); four percent indicated that they "probably" would not, and 0% "definitely" would not. See Table 5 for a summary of these responses.

TABLE 5: LIKELIHOOD TEACHERS WOULD RECOMMEND THE TRAINING TO A FRIEND OR COLLEAGUE

MT (n=181) PT (n=462)

	Master Teachers (%)	Participant Teachers (%)
Definitely would recommend	78	70
Probably would recommend	18	24
Probably would not recommend	3	4
Definitely would not recommend	1	0

Teacher responses to the tool itself. Both MTs and PTs were intrigued by the *Seeing Reason* tool, excited about the idea of introducing or expanding the role of causal mapping in their classroom, and were enthusiastic about sharing the tool with their colleagues. Many PTs commented in the survey that *Seeing Reason* was a "great tool" and "could be used across many disciplines." MTs and PTs also mentioned in surveys and in conversations during and after trainings that they liked that the tool was free; that it was available online; that students and teachers could revisit their diagrams over time and outside of the classroom; and that the tool was available on the multiple computer platforms they had available within their schools (i.e. they could use it on a Macs and PCs).

During group work and discussion time at both the MT and PT seminars, teachers expressed a number of uncertainties about using the tool with their students or during trainings with other teachers, and inquired about the technical and conceptual constraints of the tool. Primarily, these concerns were related to what teachers termed technical "glitches," such as having difficulty logging into the project workspace, troubles that arose when trying to delete factor relationships, the need to click in a factor box in order to type in it since it was not set up as a default. Some teachers' issues were more about functionality, such as being limited to unidirectional arrows, and the pre-set colors and functions of the different arrows. Due to some of these "glitches" and perceived limitations, some teachers commented that they thought the tool was still under development, and offered suggestions for improving the tool and the website. For example, several teachers said that adding some sort of graphing component to the tool would be useful, or that being able to enter more characters into the factor boxes would be helpful. RTA coordinators reiterated a number of these concerns in interviews, indicating that they had heard similar comments from other teachers as well. Teachers were happy with customer support. In conversations with teachers some time after their training, teachers who had used the tool with students consistently noted that Intel's customer support was very responsive, answering questions in a timely manner.

Teachers' engagement with core concepts of the seminars. At both the MT and PT seminars, Senior Trainers, MTs and PTs experienced the challenge of understanding cause and effect relationships for themselves, and for helping other teachers (and eventually, students) understand these relationships. The difficulty of mastering the concept of causal relationships was articulated during the seminars when MTs and PTs struggled with constructing their own project ideas. For example,

one teacher began to develop a project focused on a local controversy about property development near a protected wildlife area. She wanted to focus her students on the question, "How can a community balance economic growth and ecological preservation?" The group was enthusiastic about the project and the subsequent conversation generated many good ideas for supporting student inquiry related to the project, but it did not include a focused discussion about how to identify a portion of this issue that was specifically about cause and effect relationships that could be explored using *Seeing Reason*. Instead, teachers suggested that students use *Seeing Reason* to keep track of and group the different factors that drive both economic growth and ecological preservation. In this particular situation and in other observations, trainers needed to have more strategies at hand to help them move teachers through exploring and uncovering their misperceptions and uncertainties about causal mapping and about the role it could play in a larger research process.

In both MT and PT trainings, even when teachers created projects that did not align well with the curricular definition of cause and effect, their use of *Seeing Reason* did generate lively discussions about relevant processes, such as defining variables, the differences between objectively and subjectively measured factors, and how to manage and represent dynamic relationships among factors. Teachers found a range of strategies for adapting *Seeing Reason* to fit their needs for a particular map they wanted to create, such as drawing arrows in both directions between all pairs of factors (when they wished to represent dynamic relationships) and creating two factors for the positive and negative versions of each variable (such as poor health and good health, or low popularity and high popularity). These conversations demonstrate that *Seeing Reason* can support productive, reflective conversation about systems and relationships even when users are not focusing on cause-and-effect relationships with any specificity.

Teacher plans for using the tool in their teaching. Despite some perceptions of technical limitations, seminar participants said they did plan on using *Seeing Reason* in their classrooms. When MTs were asked if they planned to use *Seeing Reason* in their classrooms in the upcoming school year, 95% said that they "probably" or "definitely" would (28% and 66%, respectively) and only 4% said they "probably" or "definitely" (3% and 1%, respectively) would not. Approximately eighty-five percent of the PTs indicated that they "probably" or "definitely" would (49% and 36%, respectively) use *Seeing Reason* in their classrooms, and 13% said they "probably" or "definitely" (12% and 1%, respectively) would not.

MT Responses to the Seminar

At the two MT seminars researchers attended, MTs were positive and collegial throughout the day, and explicitly demonstrated and discussed that they were interested in being a part of another Intel professional development opportunity. Many MTs knew each other from prior Intel training experiences or from working in the same districts, and seemed to enjoy having the opportunity to work together again. MTs noted cosmetic consistencies and common characteristics between this seminar and Intel Teach to the Future from the curricular materials (e.g. similar binders and cur-

ricular formats) and approaches to terminology used by the trainer (e.g. linking the notion of "unit questions" with "essential questions" from Intel Teach to the Future). Master Teachers seemed to be comfortable and familiar with the general structure and approach of the curriculum, and at both seminars there were few, if any, questions about the general approach of the curriculum.

Survey data indicate that the components of the *Seeing Reason* seminar curriculum MTs found most useful (i.e. "very useful") were Creating a Practice Causal Map (81%), Setting up a *Seeing Reason* project (75%), and Appendix resources (70%). This suggests that MTs were most focused on activities that allowed them to get started on developing their own lessons and associated maps. The least useful activities were Collecting Research to Support your Project (19% "not useful" or "somewhat useful"), Creating an Assessment Plan (14% "not useful" or "somewhat useful"), and Planning Implementation and Revisiting Your Unit Plan (11% "not useful" or "somewhat useful"). MTs also had very positive responses to their trainers: 80% of respondents rated their trainer as "very effective" in facilitating participants' experience of the seminar. See Tables 6 and 7 for complete reporting of responses to these questions.

TABLE 6: MASTER TEACHERS' RATINGS OF USEFULNESS OF CURRICULUM ACTIVITIES (N=181)

Component (Module #)	Not useful (%)	Somewhat useful (%)	Moderately useful (%)	Very useful (%)
Creating a Practice Causal Map (2)	1	3	15	81
Setting up a Seeing Reason Project (2)	0	6	19	75
Appendix resources (includes sample project ideas, project examples)	0	5	24	70
Introducing Causal Mapping (1)	0	4	25	70
Planning Your Project (1)	0	4	27	68
Getting Started (Discussing the unit plan)(1)	0	7	31	62
Sharing Causal Maps and Practicing Effective Questioning (2)	1	7	29	62
Evaluating Your Project and Practice Causal Map (2)	1	8	35	55
Planning Implementation and Revisiting Your Unit Plan (2)	2	9	33	54
Creating an Assessment Plan (2)	1	13	34	51
Collecting Research to Support Your Project (2)	1	18	35	44

*Arranged in order of usefulness

TABLE 7: MASTER TEACHERS' RATINGS OF SENIOR TRAINERS' OVERALL EFFECTIVENESS (N=181)

Response	%
Very	82
Adequately	17
Somewhat	1
Not at all	0

These findings are consistent with MTs' comments during trainings, which indicated that these activities helped them to better understand cause and effect relationships because they were visual, required hands-on activity, provided models, and put them directly in contact with the tool itself while helping them to think about its curricular applications.

RTA coordinators provided useful feedback about the seminars within their regions and reported working hard to help Senior Trainers or MTs solve what those trainers identified as "problem areas" or issues related to the content, structure, or dissemination of the seminars. For example, one RTA coordinator drew on feedback from Senior Trainers and MTs when she described parts of the seminar as too lecture-driven, especially given the pedagogical intent of the curriculum: "…given that this is a program focused on problem-based learning and student-centered learning – sometimes the training gets a little off track and doesn't model that… The content and the material is excellent, but maybe the approach could be changed a little bit." Many RTA coordinators also suggested it was too overwhelming to do the seminar in one day, and many MTs expressed this as well. As one MT explained, "it is much better as a two-day seminar. But, the two days should not be consecutive – they should be about a week apart." The reasoning for this was that teachers could prepare for the rest of the seminar, and have time to develop their projects, integrate standards, and reflect on what they learned during the first session. Some people felt that, prior to the seminar, participants should be provided with relevant content standards, and should be encouraged to arrive at the training with an idea for an appropriate project. MTs seemed to be building on their prior experience with Intel Teach to the Future in many of these reactions: they clearly felt that in order for teachers to learn most effectively, prior preparation and time for reflection on core concepts were two important elements to strengthen.

Participant Teacher Responses to the Seminar

The one PT seminar the researchers attended was offered on a Saturday, and was led by two MTs, who were conducting the training on their own time. The district had not supported the recruitment process and was not providing material incentives for participants, although participants did receive six professional development credits for being there, and three for TAG (Talented and Gifted). All but one of the participants at this training appeared to be interested and engaged throughout the training, and participation in group discussions was lively. The participants were familiar with the trainers and respected their expertise (some of them had taken a training with

one of the trainers in the past), were comfortable with the general structure and approach of the curriculum and seemed to be aware of, and supportive of, the goals of the training.

About half of the participants had gone through the Intel Teach to the Future trainings. All had been personally recruited by one of the two MTs for this seminar. Two district curriculum directors had been invited to attend the training, with a goal of encouraging them to include the *Seeing Reason* seminar in the district curriculum catalogue as a regular professional development offering. Conceptual problems confronted during this seminar were similar to those described in the section on Master Teacher seminars, above.

Survey data suggest that the components of the *Seeing Reason* seminar curriculum that PTs in general found most useful (i.e. "very useful") were Creating a Practice Causal Map (68%), Introducing Causal Mapping (64%), and Setting up a *Seeing Reason* project (64%). The least useful (i.e. "not useful") was Collecting Research to Support Your Project (3%). PT responses to this question are broadly similar to MT responses, although MT responses are slightly but consistently more positive in general. Like MTs, these PTs gave their lowest ratings to Collecting Research to Support Your Project, suggesting that these seminars are not emphasizing the idea of embedding the use of *Seeing Reason* in a broader research process, or that participants are resistant to the idea of using the tool in this way. PTs also had very positive responses to their trainers: 79% of respondents rated their trainer as "very effective" in facilitating participants' experience of the seminar. See Tables 8 and 9 for complete reporting of responses to these questions.

TABLE 8: PARTICIPANT TEACHERS' RATINGS OF USEFULNESS OF CURRICULUM ACTIVITIES (N=462)

	Not useful (%)	Somewhat useful (%)	Moderately useful (%)	Very useful (%)
Creating a Practice Causal Map (2)	1	7	22	68
Introducing Causal Mapping (1)	1	8	26	64
Setting up a Seeiong Reason Project (2)	1	7	27	64
Planning Your Project (1)	2	8	28	62
Getting Started (Discussing the unit plan) (1)	1	9	31	59
Appendix resources (includes sample project ideas, project examples)	2	9	29	57
Sharing Causal Maps and Practicing Effective Questioning (2)	1	11	33	53
Planning Implementation and Revisting Your Unit Plan (2)	2	10	36	51
Evaluating Your Project and Practice Causal Map (2)	1	10	36	51
Creating an Assessment Plan (2)	2	16	36	46
Collecting Research to Support Your Project (2)	3	12	39	44

*Arranged in order of usefulness

TABLE 9: PARTICIPANT TEACHERS' RATINGS OF MASTER TRAINERS' OVERALL EFFECTIVENESS (N=462)

Response	%
Very	80
Adequately	17
Somewhat	2
Not at all	0

III. Implementing Seeing Reason

Delivering local seminars

MTs encountered a variety of challenges as they sought to turn around *Seeing Reason* seminar trainings within their local school districts, but interest in Intel programs and in the tool did drive roughly a quarter of the Master Teachers trained during this pilot to deliver seminars in their own districts.[4]

In addition to various logistical obstacles, the primary obstacle MTs perceived to successfully delivering the training locally was their own need to feel more comfortable and experienced with the curriculum and the tool itself before delivering trainings to their colleagues and using the tool with their students. When MTs discussed their responses to their training in the context of their home school, weeks or months after the training had occurred, many MTs did feel that the seminar had adequately provided them with the skills they needed to lead other teachers through the seminar curriculum. However, these MTs also felt that they needed more experience using the tool, particularly with students, before they could feel fully confident leading a seminar. They also continued to express concerns about whether various "glitches" (discussed above) would be worked out before they invited their colleagues to begin to use the tool.

MTs also cited various challenges when arranging for and implementing trainings at their local schools, including limited resources, competing professional development programs, curricular constraints, limited time for professional development, and the need to meet state or local standards in ways that would be formally recognized by the school district.

One common response to the logistical and resource challenges of implementation was delivering seminars in a range of timeframes, including an hour each day after school for a week, in one 6, 7, or 8 hour day on a Saturday, or broken in half over two different days. MTs did this in order to fit the program into the existing professional development structures (such as time slots, lab availability, and requirements for professional development credits) of their school districts.

Finally, MTs did not like having to use the supplemental materials that had been sent to them (since attending their initial *Seeing Reason* seminar training), in conjunction with the seminar

[4] This estimate reflects approximately 930 teachers being trained, in groups of about 10, by 93 of 350 Master Teachers.

Curriculum book. They would have preferred to have a new manual once all of the changes had been made since adding the new materials without being re-trained, as one MT said, "makes it hard on the trainer."

Classroom-level implementation

The limited evidence collected regarding classroom implementation suggests that although teachers found the tool interesting and could easily think of ways to use it with their students, few MTs or PTs used the tool in their classrooms within the timeframe of this evaluation (which encompasses trainings delivered from July 2003 – December 2004). Many of the teachers interviewed on site visits reported that they faced logistical, technical, or curricular pressures within their school that made it unlikely that they would ever make use of the tool. Others reported that they were moving forward with plans to use the tool, often in the context of a spring semester unit, and RTA coordinators have also shared updates from individual teachers or small groups who are planning units to be implemented during the spring semester. The choice to delay implementation until spring seemed to be based on a combination of factors, including greater flexibility in the school schedule later in the year, needing time to develop new lessons, and better curricular fit with topics addressed late in the year, such a group planning a unit on revolution, which they cover in the spring.

Preliminary evidence suggests that upper-elementary level teachers seem to be among the most likely to use this tool with their students. Students are often first asked to engage in sustained research projects and substantial presentations of their work during these grades. It is possible that because of their interest in introducing students to the processes involved in sustained research and project presentation, upper-elementary teachers may find this tool, and the project-based approach to using it describes in the curriculum, to be a particularly good fit to their instructional priorities.

Some of the most promising and elaborated lesson plans shared with the evaluation team (both at seminars and through teachers' sharing of them at later dates) are strikingly similar to one another. These lessons typically addressed upper-elementary grades and were most frequently on social studies topics, such as conflict and revolution, and the historical development of societies and countries. For example, one teacher explained that she was using *Seeing Reason* in her fifth grade class, but that she did not tell her students that they were exploring "cause and effect" relationships. She used *Seeing Reason* as a way to have students gather evidence for a debate, which emerged when a controversy arose in the class related to explorers and their role in shaping history. She explained that she used the tool to "grab their interest," and it was not clear from her explanation whether the project had actually defined a specific cause and effect problem or if she had used the tool essentially for concept mapping. This teacher had also had to work creatively to accommodate the on-line nature of the tool: Because she did not have signed permissions for all her students to use the Internet, she had them work on paper first and then created class maps with team captains.

Obstacles to implementation. Teachers did face a number of familiar challenges when seeking to implement *Seeing Reason* within their classrooms. According to survey responses, PTs reported that the largest obstacles to integrating technology into their teaching in general were a lack of planning time (34% reported a major obstacle), lack of technology access (24% reported major obstacle) and a lack of flexible classroom time (23% reported major obstacle) (See Table 10). However, 49% of respondents reported that lack of technology access was "not an obstacle" to technology integration, while only 23% and 28%, respectively, called lack of planning time or lack of flexible classroom time "not an obstacle." This suggests that levels of technology access vary across schools more widely than do other potential obstacles to technology integration, with some, but not all, schools providing adequate technology access.

TABLE 10: PARTICIPANT TEACHERS' RATINGS OF OBSTACLES OF TECHNOLOGY INTEGRATION INTO TEACHING

	Not an obstacle	Minor obstacle	Major obstacle
Lack of planning time	23	42	34
Lack of technology access in my classroom	49	26	24
Lack of flexible classroom time	28	46	23
Lack of technology access in my school	62	26	11
Lack of technical support	56	34	8
Lack of administrative support	68	23	6
Lack of instructional support	62	30	4

In addition, teachers' reports during site visits and RTA reports on their ongoing conversations with MTs indicate that the multitude of activities and resources competing for attention in participants' school districts (e.g. scheduling conflicts, limited access to computer labs, and lack of time in the staff development schedule), added more reasons for teachers not to spend their small amounts of flexible time on fulfilling *Seeing Reason* training commitments, or on implementing *Seeing Reason* into their curriculum.

Participants also described professional development (PD) responsibilities and opportunities other than those offered by Intel, which they were responsible for and schools had invested in. These other PD programs also provided challenges for scheduling and recruitment of teachers to follow-up with conducting their own seminars, and for providing time to practice how to use the *Seeing Reason* tool. In addition, as teachers explained to us during both site visits and during MT seminars (when teachers were discussing whether and how they might deliver follow-up trainings,) since there are multiple types of PD activities offered throughout the districts, seminars did not necessarily stand out in comparison to these other programs, especially since *Seeing Reason* is narrowly focused on the mapping of cause and effect relationships.

During one site visit, multiple teachers explained that intense local accountability pressures have made it increasingly difficult to find flexibility in the curriculum for using tools such as *Seeing Reason*. Some of these teachers thought about ways to integrate *Seeing Reason* into their curricu-

lum: for example, suggestions included offering *Seeing Reason* as an extra credit project for students; other teachers discussed waiting until the established school-year curriculum was over in May to use *Seeing Reason*. All of these comments indicate that teachers did not see the instructional relevance of *Seeing Reason* to their existing curricular obligations, or to core learning objectives their districts expected them to meet. Some RTA coordinators helped Senior Trainers and MTs prepare state-specific curriculum standards handouts (in paper format, CD-ROM, or URL links) to distribute at the seminars in order to illustrate to teachers how *Seeing Reason* can be aligned with local requirements.

The criteria for teachers receiving PD credits vary from district to district, and the seminar qualified for credit in some cases but not in others. Generally the seminar was considered either too short-term or too narrowly-focused to count for PD credit. Many, if not most, PD offerings developed within districts are designed to meet specific PD requirements and thus, automatically award PD credits to participating teachers. In comparison to these other programs, *Seeing Reason* does not have the same incentives, making recruitment difficult particularly since there are no material incentives offered to counterbalance a lack of PD credit. Some teachers and RTA coordinators suggested restructuring the length of *Seeing Reason* seminars (e.g. adding an online component to the seminar) so PD credits could be received.

Grade-level-specific challenges to implementation. Teachers' reports of use of this tool suggest that *Seeing Reason* is most easily integrated into grades five through eight. Opinions about the feasibility and desirability of using the tool with younger students were mixed. Within high schools, some teachers reported that it was especially difficult to find flexibility in the high school curriculum for a tool like *Seeing Reason*. As one RTA coordinator reported, "Most elementary (2nd -5th grade teachers) see no reason to use this tool in their classrooms! High school teachers don't see how to integrate this into their curriculum." Some constraints exist at the junior high level as well. One math teacher said that she would like to use *Seeing Reason* in her 8th grade math class but the only technology she is allowed to integrate is Excel. Teachers' comments varied widely regarding which students they felt *Seeing Reason* could or should be used with:

- "The *Seeing Reason* website is a good use of technology but it not really relevant to kindergarten. I feel that it is too advanced for them."
- "The only reason I wouldn't recommend this to everyone I work with is because it's not really geared toward elementary school children. However, I would definitely recommend it for teachers who are at middle or high schools. Excellent resource and the best part is it's free!!"
- "In module one, please provide sample questions that are appropriate for different age levels. For example, one question that is relevant for K-3 students, another for 4-6 students, and another for 7-8 students. "
- "I teach first grade. Much of this information will not work with this age group."
- "I teach about Cause and Effect with my 1st graders, so this is another avenue for me."

As these quotes suggest, teachers would benefit from more opportunities during the seminar to think through how the tool and/or the available examples could be adapted to the needs of various grade levels.

During trainings, MTs and PTs spoke frequently about how they "would" or "could" use *Seeing Reason* with students. However, this investigation suggests that there has been very limited follow up on these seminars with classroom-level use of the tool. For example, most of the MTs researchers spoke with during site visits after seminars had not conducted a PT training, nor had they used *Seeing Reason* with students. Further, all but one of those MTs who had conducted a training also had not yet used *Seeing Reason* with their own students.

Some evidence collected in this study suggests that although many teachers in this study reported having difficulty finding ways to use *Seeing Reason* in the classroom for the first time, an initial experiment with using the tool with students can be an enormous learning opportunity. For example, one MT did use *Seeing Reason* with his students prior to leading a PT training, and drew heavily on the experience to guide his training session. He identified and discussed specific strategies he had used with his participant teachers, such as creating an index card system for keeping track of student groups and passwords for when working on *Seeing Reason* projects.

Students' readiness to use the tool. Teachers often reflected, both during and after trainings, on how they saw this tool potentially supporting, or not supporting, their students' strengths and weaknesses. These comments were often framed with reference to the "visual" nature of the tool. Both teachers of gifted students and special education students referred to their students as being very visual learners, and felt that this tool would be appropriate for them. Some teachers of gifted students also explained that their students would use the tool successfully because they are ready to work with complex systems and are able to think about patterns and relationships among variables. Some teachers of special education felt that *Seeing Reason* was not visual enough, comparing it unfavorably to Inspiration and Kidspiration in this regard. However, other teachers thought that *Seeing Reason* was "better" than Inspiration because it was simple to use and focused on exploring cause and effect relationships. Other comments from teachers regarding *Seeing Reason* and students' needs and abilities included the following:

- "It will be challenging to see what modifications I need to make as a teacher of the visually impaired."
- "I have some concerns about using this type of lesson with English language learners. It is fairly complex and may be very difficult to explain to ELL students. A large percentage of our students are ELL. Teachers are concerned about adding any additional work to their teaching schedule. My job will be to convince them that this project will actually save them time or they will never try it."
- "It will allow both visual and auditory learners to work together on projects."

Dissemination and communication issues regarding the pilot

In conversations weeks or months after their seminars, many MTs reported that they believed they had successfully followed up on their training experience even though they had not delivered a formal seminar to a group of colleagues. Instead of actually conducting seminars, these MTs used the *Seeing Reason* tool with their students, informally shared what they have learned with others in their schools, offered a condensed version of the seminar training to a group of colleagues, or included *Seeing Reason* in a district-wide technology showcase. In addition, conversations with MTs and RTA coordinators repeatedly revealed that they did not believe that Intel had any specific expectations of how they should follow up on their own *Seeing Reason* seminar. As one RTA explained:

> *"…It wasn't until that late in the year that we found out that we, the RTAs were supposed to go get trained and offer this training and expect each MT would teach it – that was a big surprise. It was not in the original RFP. …it bothered me requesting that my Master Teachers would have to [teach] because they are already stretched to the hills… For most of them it was not an issue at all. And so what I did was I just suggested it, rather than require it, and that's all I could do because I had nothing to hold over their head anyway."*

RTAs and MTs also felt they received unclear messages about what professional development activities Intel was rolling out next for MTs and PTs, where this seminar fit into that plan, as well as what expectations were being set by Intel for MTs participation in those activities. As one RTA coordinator recently said, "I think the largest obstacle for me is communicating a clear message. The program has changed and some folks are easily confused. Getting a clear message out there has been a bit of a challenge. Intel has created some wonderful programs but in the process, confused the educator by adding so many. I would love to see Intel create a print piece that clearly outlines what they are offering, to whom, and who is qualified to take [what]." This message is consistent across RTA coordinators' comments.

Teachers were also unclear about the future of Intel Teach to the Future and the relationship between that program and the *Seeing Reason* seminars. In some schools, teachers spoke about Intel Teach to the Future being "over," and viewed the *Seeing Reason* seminars as the next Intel professional development offering for teachers. But at the same time, the *Seeing Reason* seminar itself was often assumed to be part of some larger initiative: during one site visit, multiple teachers explicitly inquired about what would be "next from Intel?" They were uncertain if any sequence was connected between Intel Teacher to the Future and the *Seeing Reason* seminars, if an *Intel Teach to the Future 2* or *Advanced Intel Teach to the Future* would be produced, or if other types of seminars would be rolled out in the future. Other teachers believed that the *Seeing Reason* seminar was replacing the Intel Teacher to the Future program.

DISCUSSION

This discussion draws on findings presented above and highlights three key topics: teachers' views of Intel as a provider of professional development, the successes and challenges of the seminars themselves as learning experiences, and the challenges involved in adequately supporting and documenting teachers' use of this tool in the classroom.

Teachers have high expectations of Intel as a provider of professional development. Master Teachers consistently demonstrated, in direct conversation with evaluators, in their own discussions, and in comments on surveys, that they were excited to pursue more professional development opportunities sponsored by Intel; were confident that Intel would provide high-quality, useful training experiences; and were appreciative of Intel's respect for them as professionals. Teachers trained by Master Teachers also expressed enthusiasm for, and confidence in, Intel-sponsored professional development.

However, along with this enthusiasm came high expectations. Teachers want a clear idea of what Intel will be offering to them now and in the future, and felt that this seminar did little to help answer this question. Teachers were not aware that this seminar was a pilot, and *Seeing Reason* was not presented as one part of any larger set of offerings, or put in any clear sequential relationship with Intel Teach to the Future.

A clear statement of the purpose of the *Seeing Reason* seminar, and of any series of seminars, would need to accomplish three things: justify and recommend a specific sequential relationship between Intel Teach to the Future and this seminar (or sequence of seminars); identify specific, immediate classroom-level challenges that teachers would be able to address during the seminars; and explain how participation in one, some, or many seminars would help teachers to support their students' learning more effectively. Providing this type of programmatic rationale at the pilot stage would have contributed significantly to teachers' ability to begin making use of *Seeing Reason* in the ways that the curriculum designers originally intended.

Response to and effectiveness of the training. Teachers were uniformly enthusiastic about the training. However, the evidence collected in this formative evaluation consistently indicates that despite their positive response, teachers took a number of messages away from the training that were not consistent with its original goals. These perceptions are useful not only for what they tell us about how the training can be improved, but for how they illustrate teachers' needs, interests, and priorities.

Regarding the tool, teachers consistently resisted the idea that this was a specialized tool intended to support the teaching and learning of a very specific domain of concepts. This was most commonly expressed by teachers who equated *Seeing Reason* with Inspiration in various ways. But, it was also frequently expressed in teachers' lesson plan topics, and in their plans for how they might use the tool with their students. For example, teachers sometimes developed lesson plans that involved using the tool to map relationships among characters in a novel, to represent

relationships among various types of categories, or to represent, for testing purposes, a known dynamic system such as the nitrogen cycle that had been presented in class.

These teachers' interest in using any newly available resource to support the full range of their teaching needs is entirely appropriate and understandable. It is evidence of their desire to address immediate, pressing instructional needs. As this report demonstrates, the relevance of *Seeing Reason* to the various key content areas these teachers are charged to address was not always clear to them. If Intel is invested in presenting this and other online thinking tools as supports for specific domains of thinking and learning, the seminars will need to be refined in order to focus teachers more rigorously on those specific topics. For example, this seminar did not stress the discussion of how students could build an understanding of cause and effect through a process of inquiry (although these types of inquiry were represented in some of the online examples, such as the traffic jam project, and the steps were included in the curriculum). Our evidence suggests that instead, during actual seminars, teachers were often engaged extensively in practicing the first stages of building such an understanding themselves (by exploring existing causal maps and brainstorming new ones), but processes of hypothesizing, researching and revising was not featured extensively enough to communicate to teachers the centrality of this process in the use of *Seeing Reason* that this seminar was intended to feature.

Follow up on training. Several factors limited both the amount of classroom-level implementation of this tool. First, Master Teachers were less likely to turn around trainings in their home school districts because they were not aware of this expectation until during, or sometimes well after, the seminar itself. Lack of lead-time to plan for offering the seminar, and minimal accountability were consequences of this lack of awareness. Further, the relatively small scope of the seminar (at least in comparison to the familiar 40-hour Intel Teach to the Future), as well as the narrowly-specified topic (cause and effect) made the seminar a difficult "sell" in some districts, particularly larger ones, which were likely to have many professional development offerings already planned. Finally, because Master Teachers did not plan ahead for delivering this seminar, they were rarely able to provide their participants with professional development credits, further lowering teachers' motivation to participate.

In trainings, teachers were able to come up with a wide range of potential uses of this tool in their classrooms. However, as described above, a number of technical and logistical challenges made it difficult for teachers to then follow up and actually use the tool with their students. Limited access to technology, limited time for extended project-based work, and accountability pressures all make it difficult for teachers to begin exploring how to best use this tool with their students. However, some teachers have certainly used this tool with their students since their seminars, as evidenced in part by RTA coordinators who have shared teachers' experiences with us anecdotally.

RECOMMENDATIONS

Three recommendations based on this formative evaluation are proposed below:

- *Increase Seeing Reason seminar focus on the student learning outcomes that are immediately relevant to teachers, or broaden the scope of the seminar.* Unlike the productivity tools featured in Intel Teach to the Future, a cognitive scaffolding tool like *Seeing Reason* is designed to support students' mastery of a very specific set of reasoning skills in the context of a broader process of inquiry. Research suggests that professional development that emphasizes how students learn a specific content or concepts is most likely to result in improved instruction in the classroom (Kennedy, 2001). However, the research also suggests that delivering this type of professional development is very difficult to do, and this evaluation's findings are consistent with that body of knowledge. If the *Seeing Reason* seminar is going to be one of a series of seminars that are all focused on equally specific cognitive domains, then Intel will need to consider how to focus the seminar experience much more tightly on how teachers can diagnose, monitor and support students' learning of those concepts. Further, this learning process will need to be clearly tied to core content and process knowledge domains that teachers will recognize as being central to their curriculum and to student testing mandates. If, however, *Seeing Reason*'s emphasis on scaffolding a particular reasoning process represents one of many facets on how online thinking tools can support the learning process more broadly defined, then the seminars as a whole will need to communicate clearly to teachers how the various tools and others like them can fit together to support students in their project-based work. This would allow the specific content or concepts to be emphasized in the project up to the teachers' discretion, allowing them to identify the relevance of the various tools to their own instructional priorities.

- *Clarify communications about the structure and goals of current and future Intel Innovation in Education professional development programs.* In the current climate of strong accountability pressures and limited time and budgets for professional development, not only teachers but their administrators need to understand clearly how their current needs can be met by participation in Intel's programs, and whether and how a long-term investment in Intel's programs could support broader and deeper improvements to their teachers' instructional abilities and the quality of technology use in their schools. This requires communicating the instructional goals associated with the professional development program and the relevance of those goals to a districts' local priorities not only for technology integration but also for supporting student learning. Finally, districts need to be made aware of the roles they can play to ensure the success of the program, such as providing access to adequate computer lab space, publicizing the training and supporting recruitment, and providing some kind of incentive for participation.

- *Continue to build a professional community among MTs involved in Intel programs.* Teachers continue to express that being part of Intel Teach to the Future, and now *Seeing Reason* seminars, connects them with a community of educators in which they are treated as professionals. Master Teachers are continuing to build a history with Intel, and feel a sense of dedication to

the Intel Innovation in Education programs. By continuing to invest in building community, and by supporting a high level of professionalism among teachers, Intel will provide a form of incentive to Master Teachers, regardless of if they are receiving other incentives (e.g. PD credits, stipends, technology products, etc.). The experience of participating in a growing professional community over time seems to be motivating MTs who had been part of the classic Intel Teach to the Future program, where more incentives were available, to continue to invest in and support new Intel programs, including the seminars. While participating teachers are less closely identified with Intel, this evaluation suggests that a significant number of seminar participants are former Intel Teach to the Future participants. As these teachers accrue experience with Intel programs, they need to be invited to see themselves as participating in an ongoing professional development experience and joining a community of teachers working toward a coherent set of goals.