

**Intel Teach® Essentials 10 Unit Plan Assessment
and Classroom Implementation Study**

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CONTENTS

| | |
|-----------------------------------|----|
| Executive Summary | 1 |
| Introduction1 | 5 |
| Methods..... | 6 |
| Unit Plan Assessment Results..... | 11 |
| Findings | 19 |
| Discussion..... | 29 |
| References..... | 30 |
| Appendix A | |

EXECUTIVE SUMMARY

This report presents findings from evaluation research on the Intel® Teach Program’s Essentials Course, version 10 (hereafter referred to as “Essentials 10”), conducted by the Education Development Center’s Center for Children and Technology (EDC/CCT). Version 10 of the Essentials course has been updated to include Web 2.0 tools and places a larger focus on formative and summative forms of student assessment. Essentials 10 may be offered to participating teachers in one of two formats: face-to-face or hybrid formats. This evaluation investigated how teachers are incorporating the pedagogical concepts and tools from Essentials 10 into their unit plans and how they are implementing each version into their classrooms.

This study used two evaluation strategies: (1) an analysis of 42 unit plans produced in the Essentials 10 training; and (2) 12 participant teacher interviews about the implementation of their units in the classroom. EDC researchers assessed all 42 unit plans on six core aspects that Essentials 10 emphasizes: project approach; 21st century skills; unit question (curriculum framing questions); technology integration; assessment; and comprehensiveness of the unit plan. EDC researchers also developed an artifact-based interview protocol to gain further information from participant teachers on their unit plan and its implementation in the classroom. The interviews were performed face-to-face when possible or over the telephone.

Our research goal was to investigate how well the core aspects of the course were integrated in the unit plan and how teachers used their unit plan following course completion. Findings from this study suggest that the new Essentials 10 course was an effective professional development experience that successfully influenced teachers in promoting the use of new ICT tools and pedagogical practices. This evaluation found that Participant Teachers from Essentials 10 were using Web 2.0 tools to enter a new on-line environment to promote new interactions with students and to create interaction among students. Participant Teachers were also incorporating certain pedagogical concepts from the training into their unit plans and even more strongly in their classroom implementation. The unit plans showed a strong use of both formative and summative assessments and the interviews with Participant Teachers revealed a shift to include a greater variety of assessments, especially formative assessments and those aimed at 21st century skills. The impact found was consistent across the hybrid and face-to-face versions of the program as well as all grade levels.

Promoting the use of innovative and exciting new tools in education

Essentials 10 is an introduction to the social networked world that is emerging on the Internet which teachers report finding both exciting and challenging. About half of the participants are incorporating Web 2.0 tools into their lesson plans.

The fact that Essentials 10 is many teachers’ first encounter with the novel world of social networking was a crucial factor that shaped much of the program’s impact on educators. As an initial experience in a multi-lineal, interconnected, online environment, the experience was both exciting and confusing for participants. A number of the participants interviewed talked about the program creating new, innovative learning experiences for teachers themselves, one that

immersed them in the world of their students. These participants felt that the “web-infused” and “social networked” nature of the course was pushing teachers to learn in new ways. One participant in the face-to-face training commented “the course really is an experience that forces teachers to shift their learning process/learning styles to be similar to those of the kids.”

The evaluation suggests that the course was an opportunity for teachers to become familiar with an aspect of their students’ lives that they may have found alien and to think about how it can support learning. For example, another teacher realized that having her students post comments on a wiki “was like breathing [to them], even though it was still out of my comfort zone.” For these teachers, the course helped them create activities that aligned with at least one aspect of students’ lives outside of school. Essentials 10 did not require that teachers use Web 2.0 tools in their unit plans, but nearly half of the unit plans we evaluated attempted to incorporate some of the four tools presented in the course (i.e., wikis, blogs, googledocs, social bookmarking). Given that the Web 2.0 tools and the socially networked world they support were so new, even small uses of Web 2.0 tools in the classroom may lead to additional use and increased excitement around them.

When used effectively, the Web 2.0 tools promote positive shifts in the class environment, peer relationships, and student-teacher relationships.

From the interviews with teachers who were using the new Web 2.0 tools, it was evident their use of the tools helped break down the classroom walls and extend the students’ and teacher’s relations and conversations outside the class. These teachers had created wiki sites and blogs that supported many different student activities, not just a single lesson plan or unit. Teachers were using wikis for students to post work, organize activities or to undertake activities extending throughout the entire semester. In some of the examples we saw, the wiki was not the end of a process or a “final product,” but information that supported an on-going learning process.

Teachers also commented that the wikis facilitated student group work on projects because it reduced the amount of face-to-face meeting time students needed and allowed students to share work on the project asynchronously. By using the wiki to post and share evolving project work, student teams were able to monitor and support each other’s progress without needing to constantly meet face-to-face. It was also easier to view the work of other groups and communicate and share ideas to support others.

Promoting pedagogical change

Teachers are integrating many of the assessment strategies and ideas discussed during the Essentials 10 course.

The new version of Essentials received positive responses regarding the pedagogical content, the strongest being an increased focus on issues of assessment. In addition to encouraging teachers to incorporate pre-assessments, formative assessments and summative assessments, the course also offers a tool for teachers to create their own assessment rubrics. The evaluation suggests that teachers responded well to the assessment resources; of 42 unit plans, formative assessments for monitoring student progress were included in 83% of the units and 95% of the units included

content-based summative assessments. In interviews, participants reported experimenting with new assessment strategies they learned about in the training. Participants often made comments like the following: “I found the assessment aspects very useful. As I was looking back at what I had done previously I started rethinking all my assessments – the ones I used really did not assess what I thought I was assessing.”

Hallmarks of effective professional development

The unit plan design process is an effective professional development strategy.

The evaluation findings suggest that the professional development strategy of asking teachers to create a unit plan in training is effective in deepening teacher competency because it extends teachers; reflections on the course content into their classrooms. Comparisons of the quality of the unit plans created in the training and the quality of the actual implementation in the classroom found that the quality of the unit was higher in the implementation suggesting that the learning process continues after the training itself through the use of the unit plan. Indeed, participants specifically discussed how the unit plan they developed in the training was a way to bridge the gap between the theory presented in the training and the applied world of their classrooms. Participants reported that the training introduced them to new concepts and technologies; that the unit-plan design process helped them think through the pedagogical uses; and the unit plan guided them through actual experimentation in the classroom.

The hybrid format and the face-to-face format produced unit plans of similar quality.

The evaluation did not find significant differences between unit plans from either format. The unit plan scoring process resulted in an average Kappa value (for inter-rater reliability) of 0.884, indicating strong reliability and accurate scoring. The analysis of those scores comparing unit plans from the hybrid versus the face-to-face version did not find statistically significant differences in the overall scores. Only one sub-item, activities to support media and technology skills, was significantly higher for the face-to-face version over the hybrid version. These findings suggest that teachers who complete either format are likely to produce quality units. The high quality units were also consistent across all grade levels.

INTRODUCTION

This report presents findings from evaluation research on the Intel® Teach Program’s Essentials Course, version 10, conducted by Education Development Center’s Center for Children and Technology (EDC/CCT) in 2008. This evaluation investigated how the pedagogical concepts and tools in Essentials 10 are being incorporated into unit plans and the corresponding classroom implementation.

Essentials 10 is part of a portfolio of professional development programs supported by the Intel Education Initiative. Essentials 10 engages teachers in learning about 21st century skills and the integration of technological tools that support these skills in teaching and learning. Teachers design a project-based unit of instruction aligned to their grade level and subject area standards that incorporates Web 2.0 tools, productivity software, 21st century skills and formative and summative forms of student assessment. The course’s overarching goal is for each teacher to leave the course prepared to “effectively implement a technology-rich instructional unit that engages students in effective use of technology to achieve standards.”¹

Essentials 10 may be offered to participating teachers in a face-to-face format or a hybrid format known as the Teach Essentials Online Course. The face-to-face format consists of instruction delivered through eight curricular modules in 32 hours of face-to-face training with 20 hours of homework. The hybrid format is 14 hours face-to-face and 46 hours of facilitated online training. Senior Trainers (STs), trained by representatives of a national training institute, are responsible for training district-level Master Teachers (MTs) who are then encouraged to deliver the training to at least 10 Participant Teachers (PTs) locally. MTs trained via the Essentials Online Course have the option to deliver their local training in a face-to-face or hybrid format. This report contains findings from both delivery formats.

The evaluation sought to take a preliminary look at how participants of Essentials 10 follow up on the training back in their classrooms and how the Web 2.0 tools are being used in a classroom environment. Our research goal was to investigate how well core aspects of the course are integrated in the unit plans and how teachers use their unit plan following course completion. This evaluation was based around two sets of data: an analysis of 40 unit plans created by Participant Teachers during the Essentials 10 course; and an artifact-based interviews with 12 teachers about the implementation of their Essentials 10 unit with their students. Our research questions included:

- How are the pedagogical strategies and Web 2.0 tools being incorporated into unit plans? How are these strategies and ideas enacted in the corresponding classroom implementation?
- Are there significant similarities and differences in units produced from each version of the program?
- What is the relationship between the quality of the unit plan and the actual implementation?

¹ <http://www.intel.com/education/teach/us/essential-course.htm>

The Essentials 10 courses are being improved and newer versions will be released in the summer of 2008. Thus this report is focusing only on the consistent core aspects of the course: the main pedagogical strategies, the Web 2.0 tools, and the creation of the unit plan. Several trends emerged from this focused evaluation, including a positive response from Participant Teachers to the pedagogical components and the opportunity to learn and incorporate technology into their unit plans and teaching.

METHODS

The methodology was designed to give evaluators a more reliable understanding of the Essentials 10 unit plans, from face-to-face and hybrid versions of the training, by helping us to understand how the pedagogical concepts and tools are being incorporated into unit plans and the corresponding classroom implementation. We describe below the data collection and analysis methods for the strands that comprise this evaluation: (1) unit plan analysis and (2) artifact based participant teacher interviews.

Unit Plan Collection

EDC researchers collected unit plans from 42 Participant Teachers: 22 from face-to-face trainings and 20 from hybrid trainings. We initially sent a request for the voluntary submission of unit plans to all Participant Teachers who completed either type of training and received 22 unit plans from face-to-face participants and 6 from hybrid participants. EDC sought to collect voluntary submissions from the online participants to avoid selection bias even though all participants in the hybrid trainings had pre-authorized evaluators to examine their unit plans when they registered. However, since submissions fell short of the 20 unit plans from each type of training, stratified² random sampling of completed unit plans³ was used to select the remaining 14 unit plans from hybrid trainings to be used in the study.

Unit Plan Analysis

Unit plan analysis began with the creation of the *Essentials 10 Unit Plan Assessment Rubric* (see Appendix A). After reviewing the topics presented in the training, the evaluation team selected six major dimensions that should be common to all units. A rubric was created to assess them in the unit plans created by Participant Teachers during the Essentials 10 course. The rubric was created to mirror many of the self-assessment rubrics in the Essentials 10 manual. The elements represented are not meant to be exhaustive, but highlight six core aspects that Essentials 10 emphasizes as teachers complete the course and create the units: project approach; 21st century skills; unit question (curriculum framing questions); technology integration; assessment; and comprehensiveness (of the unit plan). (See the chart below or Appendix A for full details)

² Sampling was stratified across all of the completed courses, so the overall quality of certain courses would not bias the overall outcome of unit plan selection.

³ Completed unit plans were selected because approximately half of the randomly selected unit plans from the hybrid version of Essentials 10 were obviously incomplete, which would skew rubric scoring.

The initial draft of the rubric was cross-checked for face and content validity and was piloted by rating a small sample of unit plans. Researchers discussed each point of the rubric after piloting to discuss and clarify each scale and criteria. This process was twice repeated to develop the final rubric.

To ensure consistent and reliable scores, two core researchers evaluated all 42 unit plans with a third, outside evaluator used as in inter-rater and to help establish clearer criteria if any debates arose or alterations to the rubric were deemed necessary. Inter-rater reliability was performed on 10 unit plans (24%) by the outside evaluator and on 8 unit plans (19%) across the two main raters for a total inter-rater check on 43% of the unit plans. The outside researcher's inter-rater reliability was mainly used for clarification and discussions of each criterion that led to minor rubric and scoring changes. The inter-rater check across the two main raters was then used for a final reliability analysis. The goal was to achieve an average Kappa⁴ value that is considered substantial, 0.60 to 0.79, or outstanding, 0.80 and above, with the acceptable minimum Kappa being 0.50 (Landis and Koch, 1977). The average Kappa value between the two raters was 0.884, with a range of 0.6 to 1.0, indicating strong reliability and accurate scoring.

Rubric scoring allows for a total of four points to be earned on each of its 6 subsections. This rubric varies from traditional rubrics in that it does not rate the units from “poor” to “excellent”. It is akin to a complex set of checklists identifying key items and dimensions that any competent Essentials 10 unit plan should have. Given the variation in the “completeness” and clarity of the unit plans and the complexity of assessing the quality of the teaching strategies suggested based only on the written plan, the evaluators identified key items in each dimension that: a) any competent Essentials 10 unit plan would include; b) could be considered of relatively equal weight; and c) could be reasonably identified from only a written plan. Each subsection has four items and the unit plans receive 1 point if the item is fulfilled and 0 points if it is not. For example, a 4 on ‘project approach’ means the unit plan fulfilled all four of the rubric criteria listed under project approach.

Formatting the rubric in this manor allows for more comprehensive and specified analysis for each subsection of the unit plans. Analysis will look at each item individually to see what specific aspects of each subsection that unit plans were and were not incorporating. For example, if many teachers receive a 2 out of 4 on the project approach subsection, item-by-item analysis will unveil which specific aspects of the project approach were not being incorporated. This provides more specific feedback than one global score of ‘quality’; however, analysis will look at the total for each subsection to discover which core aspects of the training the unit plans are best being incorporated. Lastly, researchers will analyze how unit plans from the face-to-face training and the hybrid version of Essential 10 compare overall and on each of these subsections.

⁴ “Cohen's kappa coefficient is a statistical measure of inter-rater agreement. It is generally thought to be a more robust measure than simple percent agreement calculation since κ takes into account the agreement occurring by chance” (http://en.wikipedia.org/wiki/Cohen%27s_kappa).

Unit Plan Assessment Rubric Six Dimensions and Four Key Criteria (full rubric in Appendix A)

| |
|--|
| <p>Project approach</p> <ol style="list-style-type: none">1. The unit is an extended project that takes place over multiple sessions across two or more days.2. Students are individually asked to assume active roles, complete different and interdependent tasks with students sharing responsibilities. The unit plan must <i>explicitly</i> address issues of student roles and collaboration.3. The student tasks in the unit specifically make connections between the <i>content</i> that students are learning and things outside the classroom.4. During the project, students are asked demonstrate knowledge throughout ongoing activities that build towards a larger end product or project. The end product must be student-made and relevant to the unit’s learning goals. |
| <p>21st Century Skills</p> <ol style="list-style-type: none">1. The learning activities invite students to think critically about the content and problem solve with research, analyzing information, and developing solutions or answers.2. Students work collaboratively and communication is a necessary part of the unit plan activities.3. The learning activities contain core subject content and connect it to applications outside the classroom.4. The learning activities build information, media and technology skills through effective use of technology (beyond basic internet research and basic productivity tool use; requiring students to build a product and/or communicate what they have learned). |
| <p>Unit Question (CFQs)</p> <ol style="list-style-type: none">1. The Unit Question(s) is connected to the learning activities in such away that answering the question guides students through the activities or content covered by the unit plan.2. The Unit Question(s) must be written in a way that requires students to delve broadly into the content to analyze information to form an answer.3. The Unit Question(s) is an open-ended question that requires students to reflect on an issue that connects content information to the real world and to think critically to form an answer to a complex problem.4. The Unit Question fits into the CFQ structure and meets both the following criteria:<ol style="list-style-type: none">a) is connected to the Essential Question in such away that answering it will help students understand at least one aspect of the Essential Question; and,b) is a sufficient umbrella for the Content Questions. |
| <p>Technology Integration</p> <ol style="list-style-type: none">1. The selected technology-based tool(s) is used by students to do at least one of the following:<ol style="list-style-type: none">a) Research; b) Publishing, Presenting, Authoring; c) Collaboration; d) Communication skills (through paired or group work).2. Students revisit at least one technology-based tool, excluding Internet research, across multiple periods or use multiple technology-based tools over the span of multiple periods.3. Excluding Internet research, the selected technology-based tool(s) connect to subject content and help scaffold 21st century skills (<i>i.e. a PowerPoint or something more innovative</i>).4. The Unit Plan incorporates at least one ‘Web 2.0’ tool used to support student learning from the Essentials 10 course: blogs, wikis, googledocs, social bookmarking. |
| <p>Assessments</p> <ol style="list-style-type: none">1. The Unit Plan contains formative assessments that allow students and/or teacher to monitor progress towards completing the project.2. The Unit Plan explains how the teacher’s use of formative assessments encourages 21st century skills and learning (collaboration, self-direction, content connections, etc.).3. The Unit Plan contains at least one summative assessment that incorporates the learning process and 21st century skills .4. The Unit Plan contains at least one summative assessment that is based on clearly written content-specific criteria, as such they should value content over design elements or production standards that might be involved in the student product. |
| <p>Comprehensiveness</p> <ol style="list-style-type: none">1. Each section of the Unit Plan is completed with the appropriate content.2. The Unit Plan has well thought out and detailed instructions and procedures.3. The Unit Plan would be easy for another teacher to implement.4. The Unit Plan has learning activities that are coherent and meaningfully sequenced and integrated. |

Participant Teacher Interviews

EDC researchers developed an artifact based interview protocol to gain further information from participant teachers on their unit plan and its implementation in the classroom. The interviews were performed face-to-face when possible or over the telephone. Interviewers received PTs' unit plans and related artifacts prior to all interviews to aid discussion. Twelve Participant Teachers completed the artifact-based interview: 9 from face-to-face trainings and 3 from hybrid trainings (see Table 1). Interviewees were selected through Master Teachers with whom we have previously worked as well as through the list of PTs who submitted unit plans for this study.

Table 1. Background information of interviewed Participant Teachers.

| | Course Completed | Grade Level | Subject | Implemented Wiki* | Implemented Blog* |
|----------------|-------------------------|--------------------|-------------------|--------------------------|--------------------------|
| Participant 1 | Hybrid | K | Language arts | No | No |
| Participant 2 | Hybrid | 10 to 12 | Science | Yes | No |
| Participant 3 | Hybrid | 4 | Social Studies | No | No |
| Participant 4 | Face-to-face | 9 to 12 | Language Arts | Yes | No |
| Participant 5 | Face-to-face | 9 to 12 | Foreign Language | Yes | Yes |
| Participant 6 | Face-to-face | 10 | Social Studies | Yes | No |
| Participant 7 | Face-to-face | K to 5 | Art | No | No |
| Participant 8 | Face-to-face | 7 to 12 | School Counseling | No | Yes |
| Participant 9 | Face-to-face | 11 and 12 | Language Arts | No | Yes |
| Participant 10 | Face-to-face | 8 | Language Arts | No | No |
| Participant 11 | Face-to-face | 8 and 10 | Science | No | No |
| Participant 12 | Face-to-face | 6 to 8 | Art | No | No |

* These numbers are based on data about the actual implementation.

The main focus of the interviews was to get a sense of how teachers were applying their Essentials experience in the classroom with particular interest in hearing about their use of Web 2.0 tools. In the interviews, EDC asked teachers to describe the lesson activities, student reactions and to judge the success of the lesson. Each participant was asked about the use of Web 2.0 tools, the use of CFQs, assessments and 21st century skills. Additionally, the interviews were an opportunity for the teachers to reflect back on their training experience. In the interviews, the PTs highlighted some of the aspects of the training they appreciated the most. Researchers asked them about aspects in the training they found to be problematic. However we are not including the trouble spots in this report since their concerns echoed the points identified in an earlier evaluation (see memo of January 28, 2008 from Strother, Goldenberg, & Light).

In recruiting participants for the interviews, EDC attempted to target Participant Teachers who had experimented with the Web 2.0 tools in the classroom but it was difficult to find teachers who were using these tools with their students. In the end only seven of the twelve teachers interviewed were using wikis or blogs with their students. Two other teachers used podcasts,

which they attributed to the Essentials V10 training. Additionally, not all of the teachers actually used all the tools that were included in their unit plans. Two teachers included blogs in their unit plans but did not use blogs in the version they implemented with their students. Although, only a portion of the participants we interviewed tried to use wikis or blogs in the classroom, they did have very interesting experiences with these tools.

Participant Teacher Interview Analysis

Qualitative analysis was performed on all 12 on the interviews. ATLAS.ti⁵, a qualitative analytical software, was used to code all notes and transcriptions for patterns that both matched the dimensions from the rubric as well as uncovered classroom application themes that could not be measured by the rubric.

⁵ <http://www.atlasti.com/>

UNIT PLAN ASSESSMENT RESULTS

All 42 unit plans were assessed for the extent to which they fulfilled four key items across the six dimensions. The following section presents the key results of the analysis identifying strengths and weaknesses of the collected unit plans.

Across all six dimensions, the overall results show unit plans meet two to three criteria on average of four possible criteria. This is a strong showing but also indicates room for improvement. Comprehensiveness and Assessment were the highest rated dimensions and 21st Century Skills received the lowest score.

The unit plan rubric sets a high standard, identifying a total of 24 criteria divided across six distinct dimensions that a strong unit plan should meet. For each of the six subsections, the highest possible score was a 4 (the unit plan met all 4 of the criteria in the rubric) with the lowest possible score being a 0 (the unit plan did not meet any of the criteria). Table 3 shows the mean rating for the unit plans overall, for each subsection, and for each type of training. The unit plans reviewed are meeting 15 -16 criteria on the average, and two or three criteria within each dimension.

Table 3. Mean ratings for the unit plans by training format and overall.

| | Overall | Face-to-face | Hybrid |
|---------------------------------|----------------|---------------------|---------------|
| Project Approach | 2.52 | 2.36 | 2.70 |
| 21 st Century Skills | 2.33 | 2.41 | 2.25 |
| Unit Questions | 2.55 | 2.73 | 2.35 |
| Technology Integration | 2.64 | 2.91 | 2.35 |
| Assessment | 2.79 | 2.82 | 2.75 |
| Comprehensiveness | 2.88 | 3.18 | 2.55 |
| Unit Plan Total | 15.71 | 16.41 | 14.95 |

The unit plans were rated highest in comprehensiveness (mean = 2.88), meaning teachers were creating unit plans that were complete, detailed a coherent learning process and were sufficiently clear that other teachers could be implement (see Figure 1). Nearly half of the all unit plans (48%) met all four criteria for comprehensiveness. Assessment was also highly rated with 29% of the units meeting all four criteria and 36% meeting three criteria.

The Project Approach dimension had interesting results. (See Figure 4) 52% of the units meet three criteria and only 5% meet all four, but there was one criteria that was consistently challenging for the teachers – collaborative grouping (see below).

Figure 1. Comprehensiveness: Total number of criteria met by unit plans (as a percent).

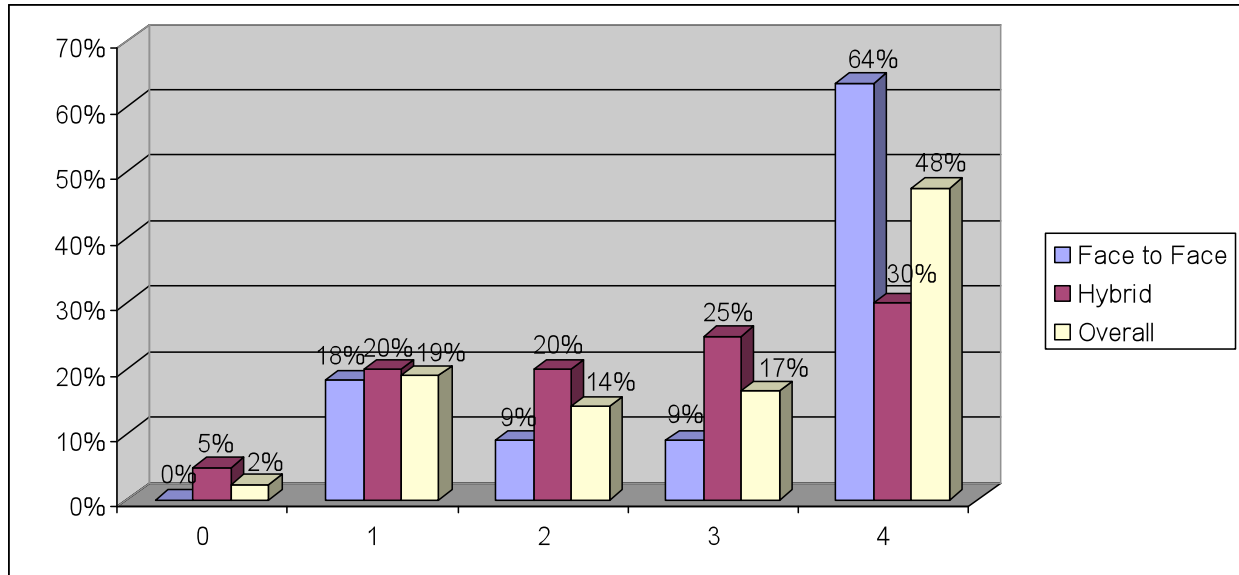
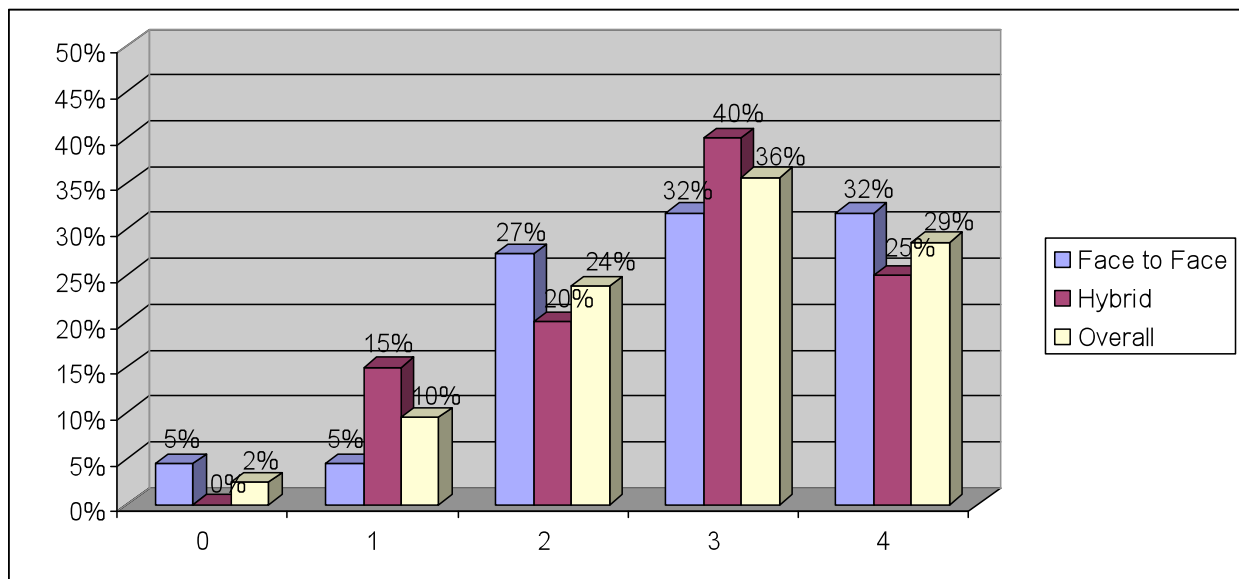


Figure 2. Assessment: Total number of criteria met by unit plans (as a percent).



The lowest rated subsection was 21st century skills (mean = 2.33). The interview participants (n=12) often stated that they feel incorporating 21st century skills into teaching and unit plans is important, but the unit plan assessment suggests that integrating the major concepts of 21st century skills into their unit plans is still challenging. (See Figure 3.) Only 10% of the unit plans met all four criteria for supporting 21st century skills, and most teachers met only two or three criteria. This Finding is similar to Goldenberg and Strother (2006) whose study of Intel Teach Thinking With Technology (TWT) found teachers that teachers intended to support higher order thinking in their unit plans but had trouble writing and discussing the specifics of how the unit plan promoted these skills. In their classroom, these TWT teachers did not optimally teach or employ higher-order thinking in their unit implementation.

Figure 3. 21st Century Skills: Total number of criteria met by unit plans (as a percent).

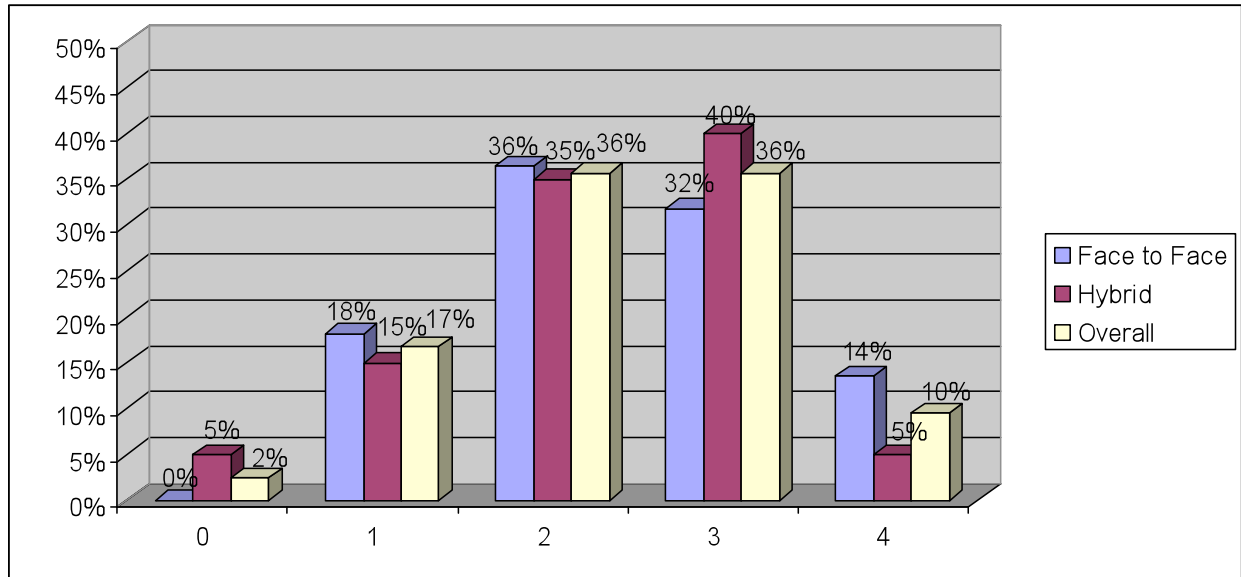


Figure 4. Project Approach: Total number of criteria met by unit plans (as a percent).

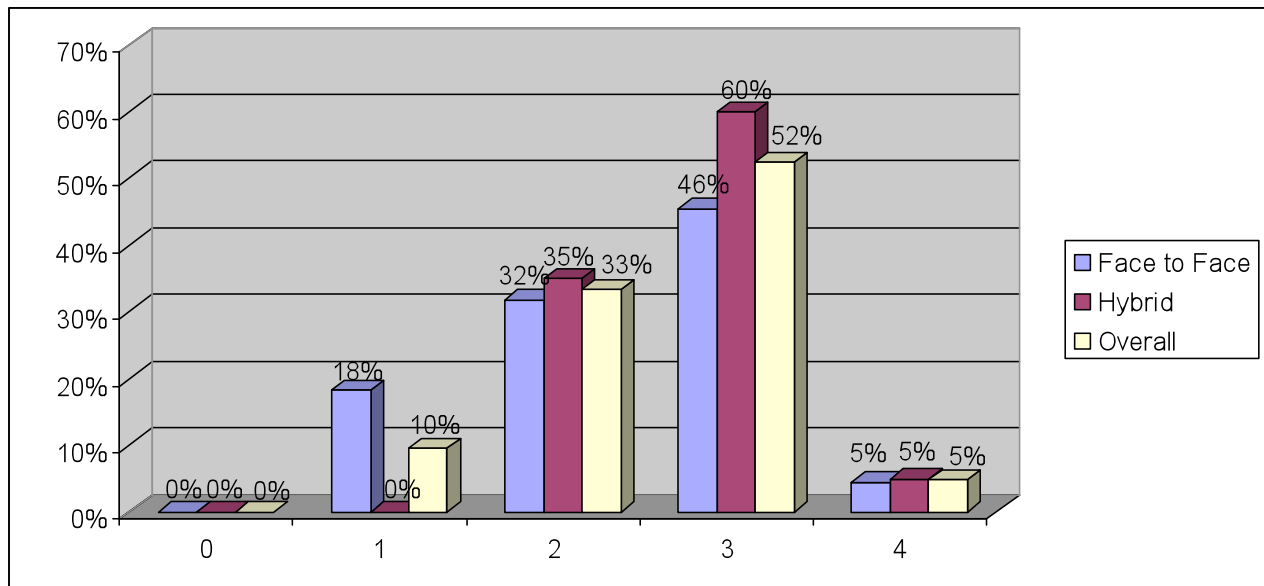


Figure 5. Unit Question: Total number of criteria met by unit plans (as a percent).

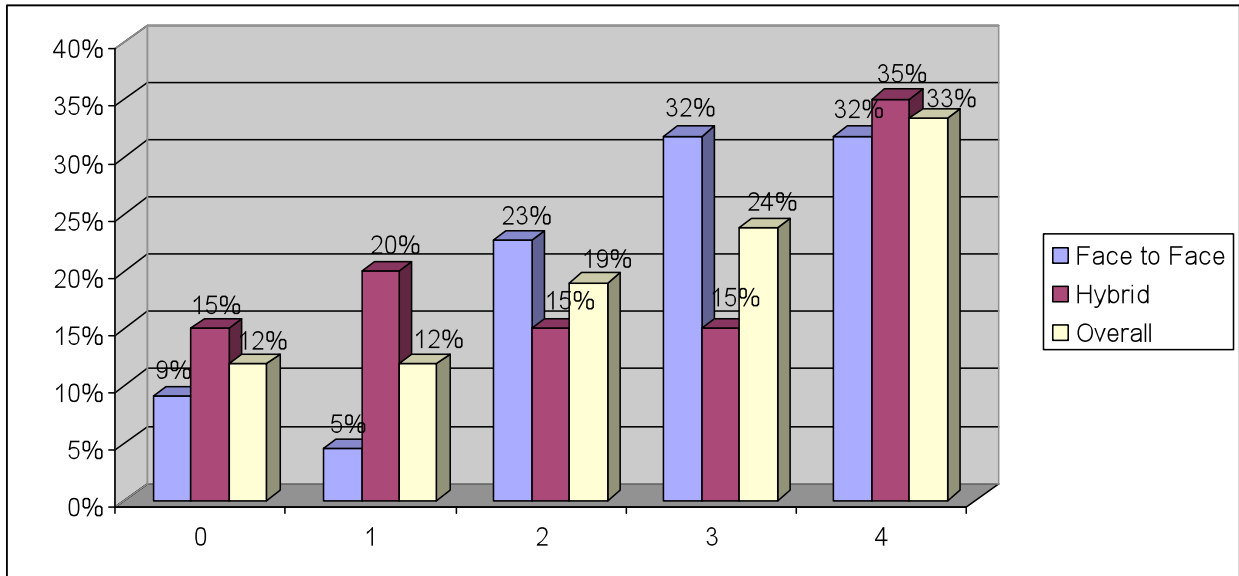
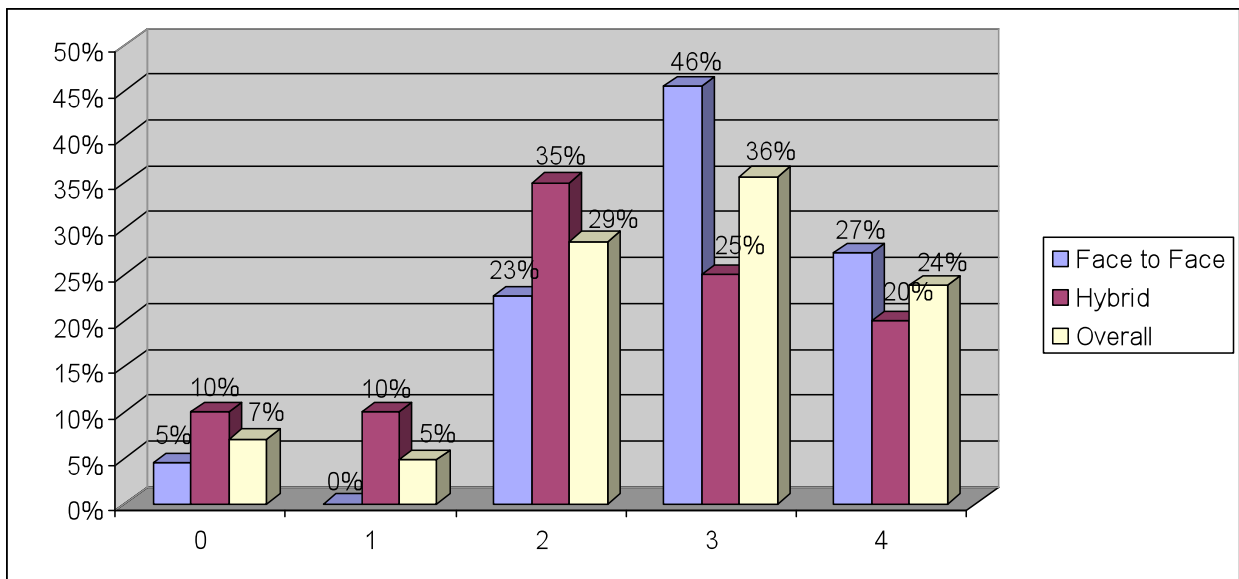


Figure 6. Technology Integration: Total number of criteria met by unit plans (as a percent).



Six specific criteria were met by over 80% of all unit plans. In particular, Essentials 10 is encouraging teachers to create long term projects, give students multiple opportunities to demonstrate what they are learning, use technology with students, use formative assessments, and use summative assessments that value content over design issues.

Figures 7 through 12 identify which criteria for each subsection were successfully met by Participant Teachers' unit plans. There were six criteria that were met by more than 80% of the unit plans, suggesting strong elements of the course. In response to the project approach that the training encourages, all of the unit plans (100%) contained an extended project and 81% of the units had smaller activities throughout that allowed students to demonstrate knowledge as they progressed towards the final product (see Figure 7). 90% of the units asked students to use technology to perform basic activities (see Figure 8). Formative assessments for monitoring student progress were included in 83% of the units. Additionally, 95% of the units included content-based summative assessments (see Figure 9). However, formative assessments of 21st century skills were low. Comprehensiveness had two strongly rated criteria, with 81% of units have learning activities that are meaningful and well sequenced, and 93% of the unit plans have each section completed with appropriate content (see Figure 10). The rating of 21st century skills and unit questions demonstrated that none of the criteria were being met by even 75% of the unit plans (see Figures 11 and 12). These remain difficult aspects of the training for Participant Teachers to fully integrate into their unit plans.

Figure 7. Project Approach: The percent of unit plans meeting each criteria of project approach (PA).

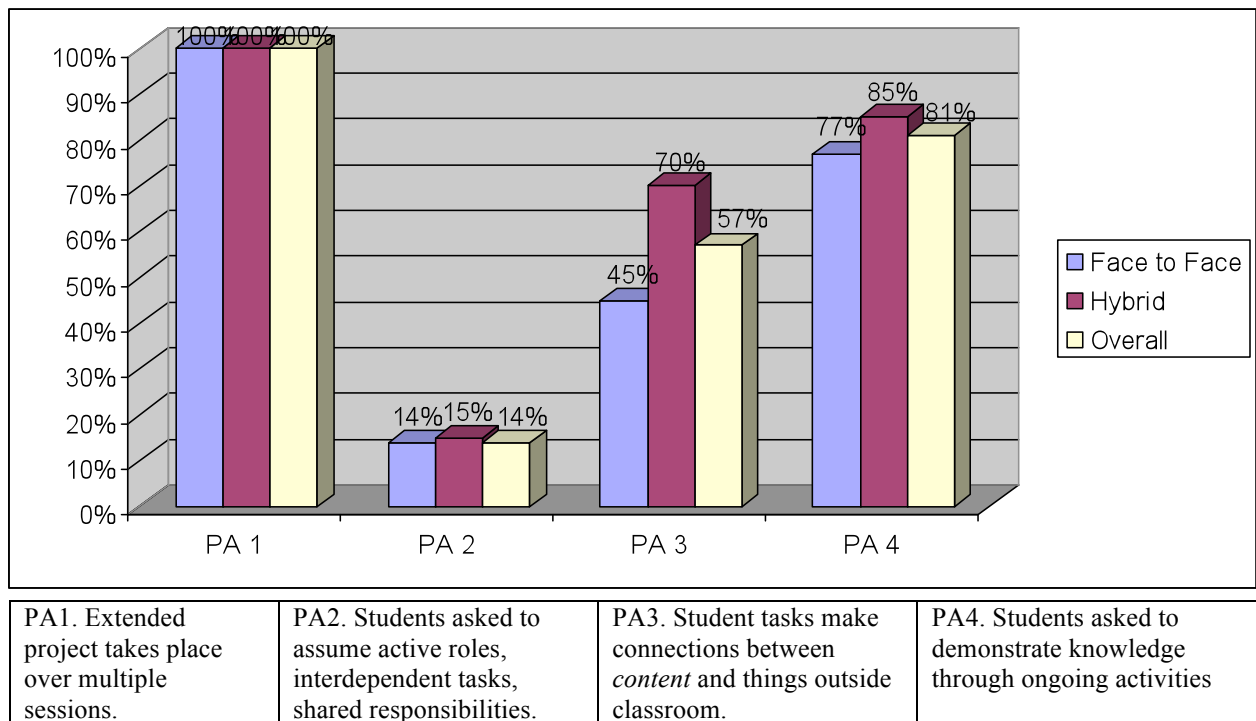
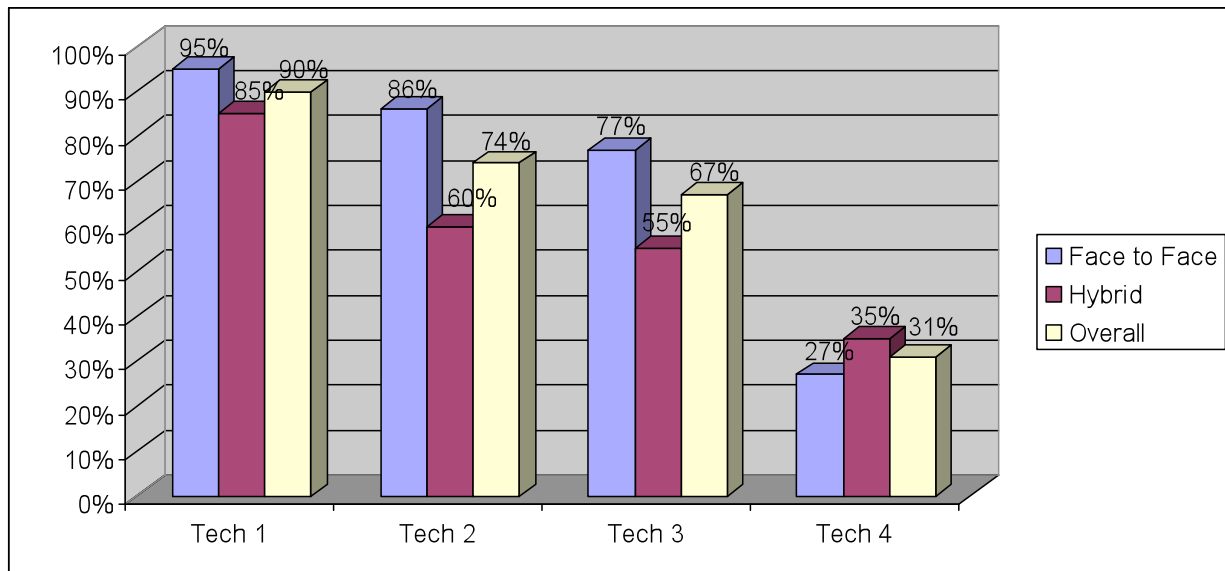
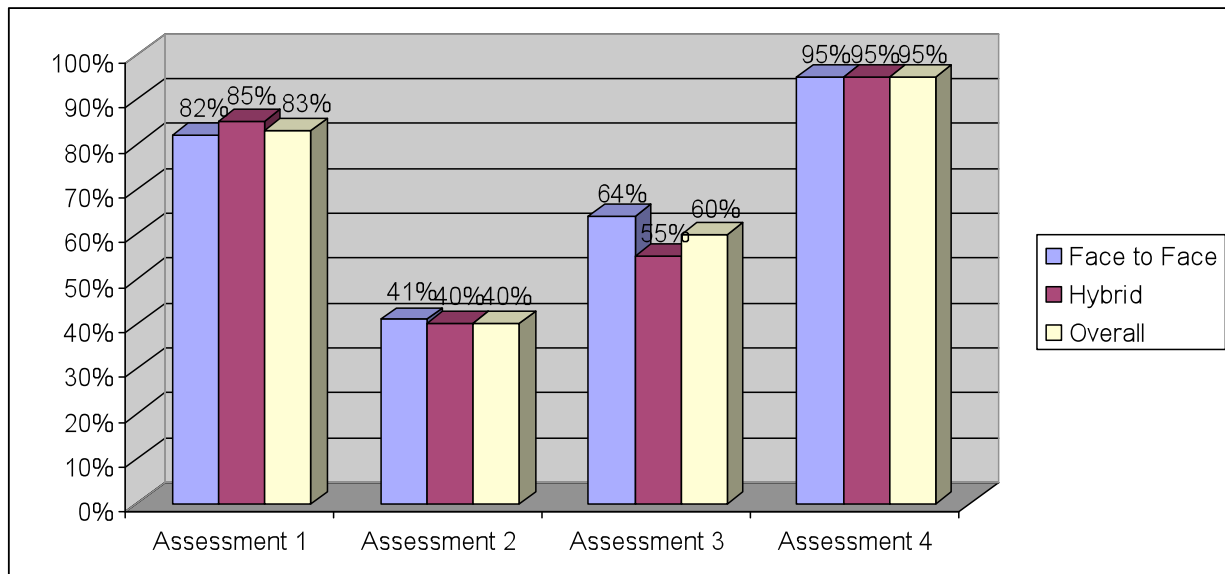


Figure 8. Technology Integration: The percent of unit plans meeting each criteria of technology Integration (Tech).



| | | | |
|--|---|---|---|
| Tech1: technology used for research; authoring, or Communication | Tech2: Students revisit technology tool or use multiple tools | Tech2: selected technology supports 21 st century skills | Tech2: incorporates at least one 'Web 2.0' tool |
|--|---|---|---|

Figure 9. Assessment: The percent of unit plans meeting each criteria of Assessment.



| | | | |
|--|---|---|---|
| A1: contains formative assessments to monitor progress | A2: explains how formative assessments encourages 21st century skills | A3: contains summative assessment of learning process and 21st century skills | A4: contains summative assessment based content-specific criteria |
|--|---|---|---|

Figure 10. Comprehensiveness: The percent of unit plans meeting each criteria of comprehensiveness.

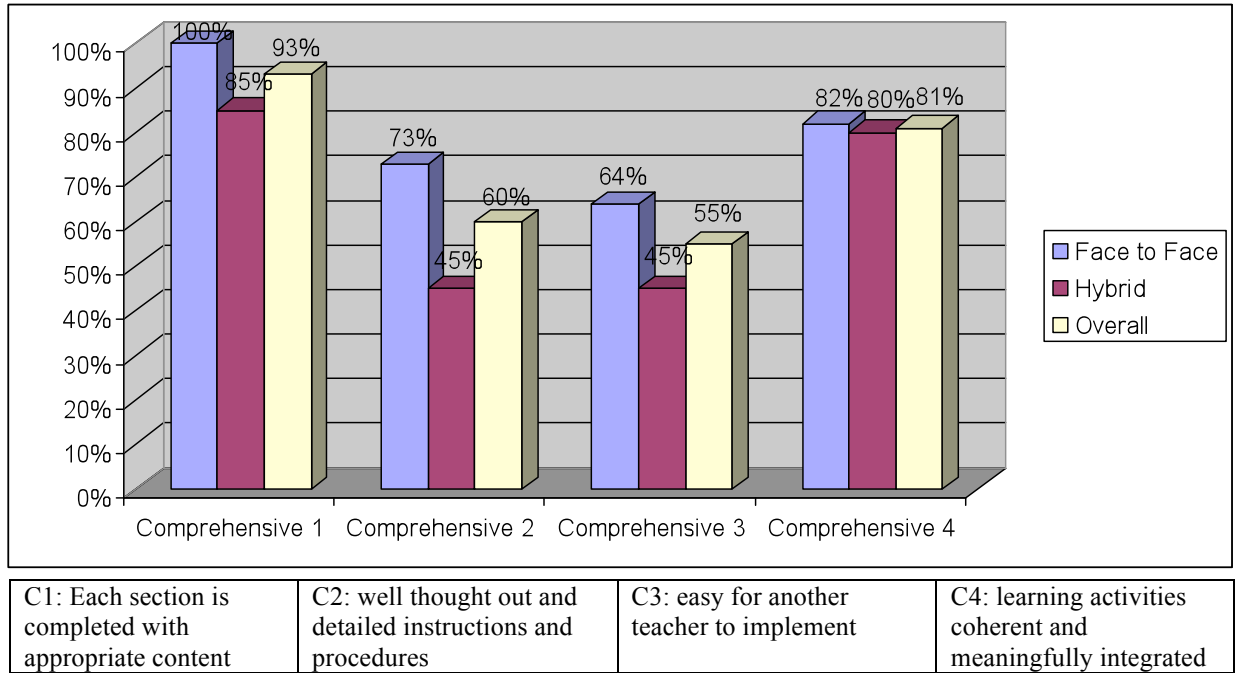


Figure 11. 21st Century Skills: The percent of unit plans meeting each criterion of 21st century Skills (21st).

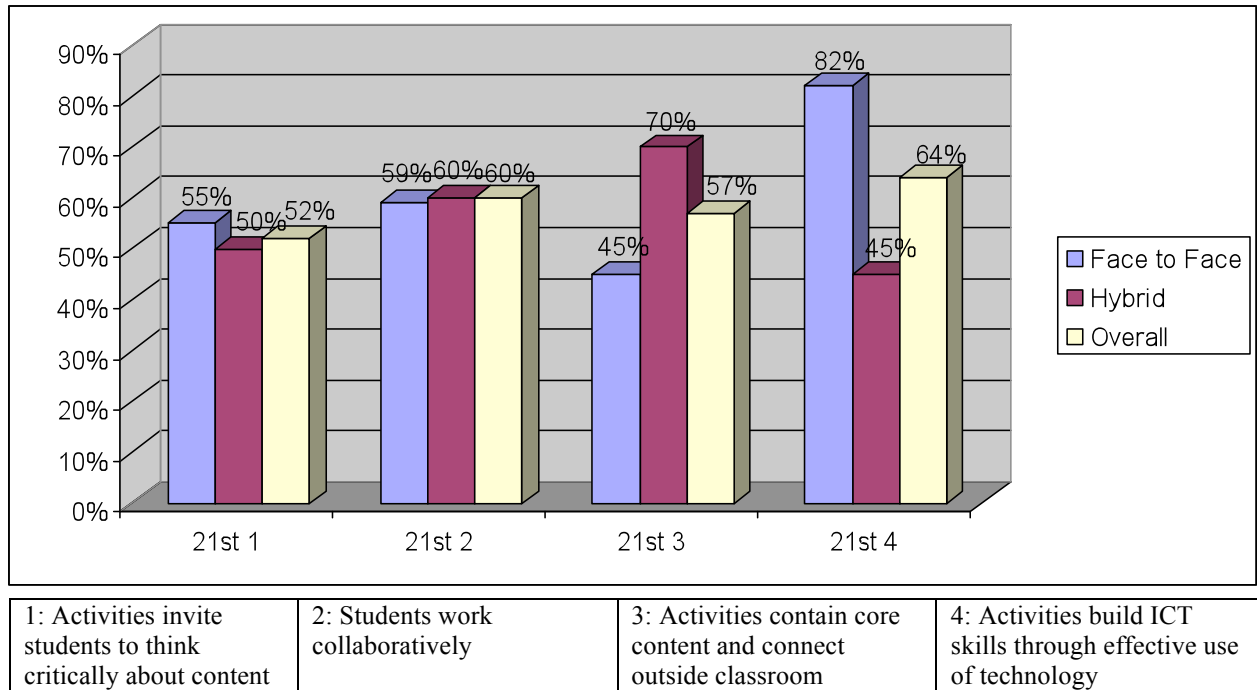
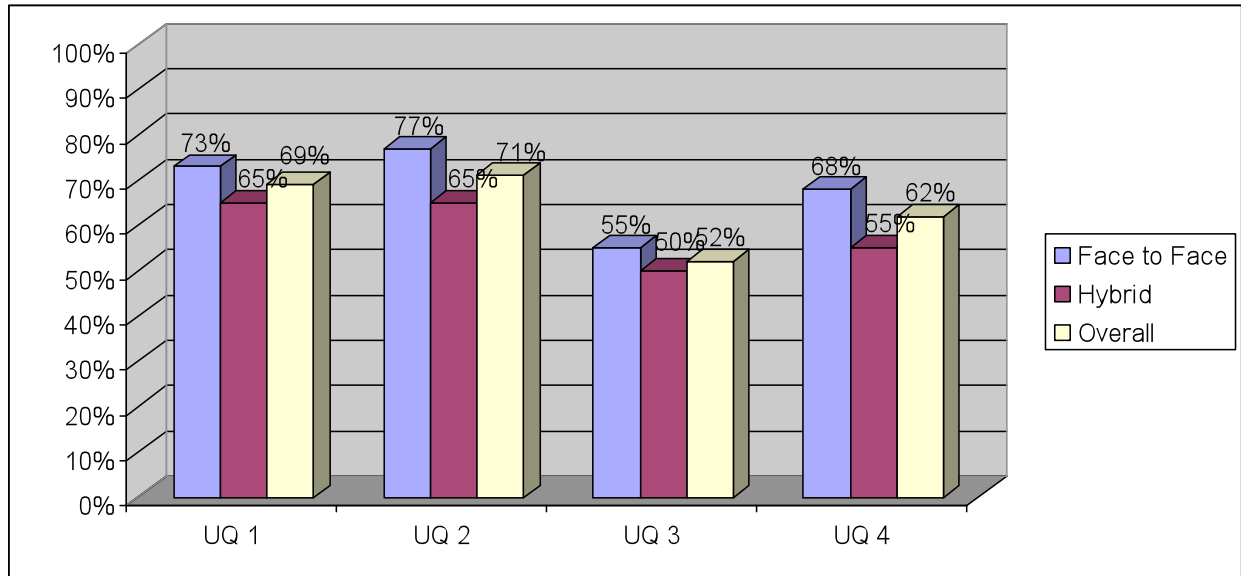


Figure 12. Unit Question: The percent of unit plans meeting each criteria of unit question (UQ).



| | | | |
|--|---|--|--|
| UQ1: answering the question guides students through the activities | UQ2: requires students to analyze information to form an answer | UQ3: requires students to connect content the real world to form an answer | UQ4: fits appropriately into the CFQ structure |
|--|---|--|--|

FINDINGS

Promoting the use of innovative and exciting new tools in education

Finding 1. A number of participants from both formats of the Essentials 10 training felt that the course offered an opportunity for teachers to experience a novel learning environment and to step into the “networked” world of their students.

All twelve participants we interviewed had generally positive impressions of the training but a number of the interviewees (n=5) talked about the program creating new, innovative learning experiences for the teachers themselves, one that immersed them in the world of their students. These participants felt that the “web-infused” and “social networked” nature of the course was pushing teachers to learn in new ways. One participant in the face-to-face training commented “the course really is an experience that forces teachers to shift their learning process/learning styles to be similar to those of the kids” (*Participant9*). Similarly, a participant in the hybrid course felt that the course was exactly what it should be: “dynamic to encourage teachers to learn in the new environment that their students are in as well” (*Participant3*).

Another teacher reflected back on the same issue and how the training helped her do a project that connected to her students’ digital worldview, even though it was foreign to her. Her students participated in posting comments on a wiki that “was like breathing [to them], even though it was still out of my comfort zone” (*Participant2*). This teacher reportedly enjoyed the new challenge and using tools that were aligned with students’ lifestyles.

Finding 2. Although it is not required that teachers use the Web 2.0 tools, nearly half of Participant Teachers attempted to integrate Web 2.0 tools into their unit plans. Teachers had pedagogical concerns as well as administrative restrictions that shaped their decisions to use Web 2.0 tools.

Fifteen of the forty-two unit plans used a wiki, a blog, or both. (See Table 2). The data also suggests that the two formats can both lead to unit plans with Web 2.0 integration - eight of the twenty-two units plans from face-to-face trainings and seven of the twenty unit plans from the hybrid version included at least a wiki or blog. None of the units used social bookmarking or googledocs.

Table 2. Number of unit plans that incorporated Web 2.0 tools.
(n=42 unit plans)

| | Wiki Use Only | Blog Use Only | Wiki and Blog Use | Total Use of Web 2.0 |
|--------------|----------------------|----------------------|--------------------------|-----------------------------|
| Face-to-face | 1 | 5 | 2 | 8 |
| Hybrid | 3 | 4 | 0 | 7 |
| Total | 4 | 9 | 2 | 15 |

Although district restrictions on certain websites was one factor mentioned, the interviewed PTs more often reported their own concerns as another factor in deciding not to use the tools. Teachers had concerns about monitoring what students post, the appropriateness of the tools for

their students, and not being able to use the tools effectively. Most of the rationales of the teachers who did not use the Web 2.0 tools were based on misconceptions of the tool. For example, one PT stated that she was worried students could just “post anything on a wiki” including inappropriate content, unaware that she could edit and filter all posts. Another concern was the perception that blogs were in “reverse-chronological” order and not in content-relevant threads. Since blogs can be organized with content threads, this comment revealed inexperience and continuing confusion on how this tool works. Participant Teachers may need more direct experience actually using the Web 2.0 tools before they implement them into their unit plans and classrooms. This finding suggests that Web 2.0 tools may be more challenging for teachers to apply and integrate into a unit plan.

Finding 3. Regardless of whether they used the Web 2.0 tools, participants valued the technology components of the training and felt that the course helped them grow in their use of technology as tool for teaching.

All 42 unit plans analyzed used technology with students and all twelve of the participants we interviewed felt the course offered them insights into new tools and applied technology. Although half of the unit plans did not use wikis or blogs, other technologies were integrated into the unit plans. Podcasts were used in two unit plans. Smartboards, Kidspiration, WebQuests, PowerPoint, and digital cameras were among the other technologies used. Some teachers took the course to challenge themselves to expand how they work with their students. For example, one teacher noted that “I’m not a really big technology person, so I wanted to challenge myself” (*Participant11*). One kindergarten teacher was surprised to discover that she could use technology with her young students (*Participant1*). Other teachers wanted to learn about new technologies or take the opportunity to work on integrating technology into their own lesson plans. “It just made me sit down and put things together that I’ve wanted to do for a long time – mostly putting technology in my lesson plans” (*Participant2*) was one teacher’s very practical valuation of the Essentials Course. This suggests that teachers valued the technology components of the course even if they did not decide to use the most innovative tools in their own unit plan.

Finding 4. Wikis, when used effectively, were used to create a community of learners among the students and to transform the culture of the classroom by encouraging students to share their work and to create shared resources and solutions to problems.

We spoke with four teachers who were using wikis in the classroom. One of the themes that stood out is the role the wikis are playing in the culture of the classrooms and the social relations among students and teachers. The teachers we interviewed had created class wiki sites that supported many different student activities, not just the unit plan they submitted. Teachers were using the wiki for students to post work, organize activities or to undertake activities extending throughout the entire semester. The tools were used to “break down” the classroom walls and to extend the students’ (and teacher’s) relations/conversations outside the class.

We interviewed three PTs who were from the same school who offer examples of how teachers were using a wiki to create an on-going discussion of the topic among the students. A history teacher used a wiki for the students to create a test review site. She put up the key themes for the AP test, and the students organized to fill in the content. The class assigned each student a topic

and, once the section was uploaded, the rest of the students would review and critique each section for accuracy and thoroughness. Another language arts teacher was trying to develop a book review site for students to share opinions and reflections about the novels they read. In both of these examples, the content posted on the wiki was not the end of a process or a “final product”, but information that supported an on-going process – test review or selecting new reading material. These examples present activities that had authentic reasons for the information to be posted and shared with other students.

Teachers also commented that the wikis facilitated student group work on projects because it reduced the amount of face-to-face meeting time students need to schedule and allowed students to share work on the project asynchronously. By using the wiki to post and share evolving project work, student teams were able to monitor and support each other’s progress without needing to meet face to face all the time. They were also able to view the work of other groups and communicate and share ideas to support others.

Finding 5. Developing an authentic or meaningful use of blogging was difficult for teachers. The individualized and reverse chronological ordering of blogs made it a complicated tool for teachers to integrate meaningfully into the learning activities.

Only three teachers actually used blogs with their students though a number of teachers said they had thought about blogs but rejected them for various reasons. Of the three teachers who did experiment with a blog, only two felt it had been a successful activity. The teachers who had used blogs and those who decided not to spoke about the challenges this tool presented. The teachers commented that the obligatory ordering of blog postings in reverse chronological order was not meaningful or helpful for their purposes. Generally teachers wanted to organize materials thematically to facilitate students finding the information, but, in their perception, blogs ordered content according to the time it was posted. There were strategies by which a blog could be structured thematically, but no teachers had developed a solution.

The two successful blog activities had pedagogical objectives that were immediate and did not require students to revisit the activities. The first example was a foreign language teacher who was introducing a travel-blog activity into each chapter of her Spanish textbook. Each chapter centers on a Spanish speaking country, and she has her students write an imaginary blog of a their visit to that country. Her goal was to get students to write in Spanish but they would not be asked to review these postings for the test so she was not as concerned about the students being able to easily retrieve each posting.

The other example was a teacher who created a class blog where all her students would post comments and questions as they developed their projects. Each student was developing their own “digital story”, and the blog became a community bulletin board. For example, on days when the class was in the computer lab, the students opened the blog in the background and used it as a message center to post questions and comments throughout the class and other students immediately responded either on the blog or in person. The students were simultaneously blogging to each other as they were working on their projects. An example, a student would post a call for help with the software and a classmate would respond, “I know how to do that – give

me 5 minutes to finish up here and I will be over”. The teacher reported there could be 45-50 posts in a 45-minute class period.

Finding 6. Issues of privacy, anonymity, tolerance, ownership and student voice are complex concerns that teachers had to consider when using the social networked tools like blogs and wikis.

The public nature of blogs and wikis, as social networking tools, was an issue of concern for many of the teachers we spoke to. Some of the concerns were around student voice and the ability to encourage students to speak freely yet appropriately and ensure that students would not face negative consequences. Teachers were concerned about students feeling inhibited to speak their mind as well as repercussions to students expressing their viewpoints. There were three teachers whose content or activities touched on sensitive areas: creative writing, bullying and stereotypes. Only one of these teachers felt her activity (on stereotypes) was effective. Two of these teachers had students post under pseudonyms. The third teacher did not do this and reported that her students did not freely engage in the blogging activity. And, this teacher felt that the blog had not been successful. Two different teachers whose students were doing history and science projects thought about this issue but decided it was not a concern because their students were focused on uncontroversial topics. Both of these teachers felt their activities were successful.

Teachers also had a second set of concerns around students’ use of appropriate language in a public venue. Partly these concerns were based on misinformation about blogs and wikis (see above). Two teachers spoke of rejecting wikis because they thought students could post what ever they wanted and these teachers did not trust all their students to use appropriate language. These teachers were unaware that wikis allows teachers to approve content before posting. Another teacher, who understood that she could edit a blog or wiki, held the opposite view. She felt the wikis created a teachable moment for students to learn how to use appropriate language and to show their maturity.

Promoting pedagogical change

Finding 7. Participants valued the pedagogical components of the training and highlighted assessments, curriculum framing questions, and project-based approaches to teaching.

Ten of the teachers we interviewed spoke positively about the pedagogical components of the training. Participant Teachers highlighted the fact that the Essentials Course integrated technology with good teaching strategies: “Intel did an amazing job of putting the two together – making technology accessible and putting it where it should be.” (*Participant 1*). Interviewees also spoke about particular elements they liked. Assessment and curriculum framing questions (CFQs) were two areas the participants valued learning about and experimenting with. Four of the twelve participants reported experimenting with new assessment strategies that they learned about in the training. The Essentials 10 course helped them rethink their assessments or introduced them to new approaches. It was not unusual to hear a comment like “I found the assessment aspects very useful. As I was looking back at what I had done previously I started rethinking all my assessments – the ones I used really did not assess what I thought I was

assessing” (*Participant11*). In the interviews and discussions of their unit plans, the teachers spoke frequently about using pre-assessments to learn what their students already knew about a topic or to bring out students’ misconceptions. Four participants also commented specifically on experimenting with the use of curriculum framing questions. Even though CFQ’s remain a challenging topic for many teachers (see Finding 12), PTs noted that they enjoyed using the CFQ’s to help frame and guide the creation of their lesson plan. And three PTs felt that the training helped them improve their understanding and use of project-based approaches.

Finding 8. Participants were assessing students throughout the entire learning process with formative and summative assessments.

Most teachers used multiple types of assessment in their units; this included both assessing at multiple points in the learning process as well as using different assessment strategies. The unit plan assessment indicated that formative assessments for monitoring student progress were included in 83% of the units and 95% of the units included content-based summative assessments (see Figures 9). In the interviews, all teachers had summative assessments but nine of the interviewed teachers incorporated both formative, or process, and summative assessments into their units. The teachers using blogs and wikis spoke about incorporating those tools into their formative assessment using students’ postings as a way to gauge student comprehension. The teacher using the class blog reviewed it daily because “the blog was a great assessment tool” (*Participant9*) since students shared their doubts and problems as they were asking each other for help.

Finding 9. Participants were using multiple assessment strategies like rubrics, self-reflection and pre-assessments in their units.

Teachers valued the different assessment strategies presented in the training and highlighted their use of different strategies in the classroom. The three assessment strategies the teachers spoke about were rubrics, self-reflection and pre-assessments. Regardless of whether rubrics were new to teachers or not, many teachers spoke about the assessment rubrics they had developed from the Essentials 10 course. One teacher, who reported already using “lots of rubrics”, felt the rubric resources from Intel were excellent. Another teacher said she “rethought” all her assessments after the training. And another teacher spoke about having students design the rubric criteria and apply them.

Five teachers spoke about pre-assessments as a new strategy they were using with their students. They found the pre-assessment to be a good way to introduce the topic, get students thinking about the problems and to identify students’ prior knowledge. For example, a science teacher spoke about using the CFQs at the beginning “to get funny answers from the kids” and then revisiting the answers after the unit so the students could point out misconceptions and recognize what they had learned.

Finally, teachers also spoke about using self-reflection for students to assess their own learning and higher order thinking skills. One teacher felt the students really enjoyed the “non-pressured assessments like self-reflection” of their skills and competencies instead of quizzes and fact-based assessments. Another teacher said that her students tended to grade themselves “very hard”

so she liked having students reflect on growth over time. Also, some teachers had students evaluate their class or group as well as their individual performance.

Finding 10. Unit plan analysis suggests that aspects of group work and 21st century skills are challenging for teachers. Less than half of the unit plans met the following criteria: collaborative roles within group work, formative assessments that encourage 21st century skills and learning, and use of Web 2.0 tools.

The analysis of the unit plans suggest that there are three elements that participants find challenging. Figures 7 through 12 above identified the percent of unit plans meeting each criterion. Most noticeably, the criterion on collaborative grouping within the Project Approach dimension was met by only 14% of unit plans. (See Figure 7.) Unit plans often discussed students' group work, but seldom addressed the need for the teacher to create individual or interdependent roles for the students. Most unit plans either had all students doing the same activities or made no mention of how, or if, the students would need organize or assign tasks.

Only two other criteria were met by less than 50% of the unit plans. One item was the use of the Web 2.0 tools that was present in only 31% of unit plans. The other criteria, the use of formative assessments for 21st century skills was present in 40% of the units. The results of this analysis indicate that even though teachers are integrating formative assessments into their teaching they are not assessing 21st century skills.

Finding 11. Many participants are attempting to assess 21st century skills but their focus is on communication, and inter- and intra-personal skills rather than the more intellectual skills, like critical thinking, problem solving or information literacy.

21st century skills was the weakest dimension in the unit plan assessments suggested that they remain a challenging topic for teachers (see Figures 3 and 11.) We asked the interviewees in various ways about the assessment plans in their units and the assessment strategies they actual used in their classrooms. Seven of the interviews spoke about assessing some student abilities that fall within the set of 21st century skills as listed in the Essentials course. However, looking across the interviews, few teachers mentioned assessing any of the more advanced intellectual or cognitive 21st century skills like critical thinking, problem solving or information literacy. Only one teacher spoke of assessing higher order thinking skills. Of 21st century skills, teachers were targeting metacognitive skills by asking students to self-reflect on the experience and what they had learned, and on communication and interpersonal skills by assessing student communication, and with peer assessments.

Finding 12. The Curricular Framing Questions remain a challenging strategy for teachers to use. Although many participants valued the curriculum framing questions, they still have difficulty integrating them into their lesson planning.

As mentioned above, four of the PTs specifically mentioned they valued the opportunity to learn about CFQ's, but we also asked all the teachers to talk about their use of CFQ's in the unit. Some PTs liked the CFQs and reported a changed understanding of how to work with their students. A special education teacher commented that "before I would water down questions to get students

to find an answer. Now, I can promote question exploration with 21st century skills. Even with a learning disability, kids won't just throw in the towel.”

However, a review of teacher comments and an examination of the CFQ's in their unit plans suggest that teachers find developing and using CFQs to be challenging. In the interviews, one teacher did not even remember the term; another teacher said “those questions seemed like a big waste of time up front in planning” and two teachers commented that the CFQs helped them develop their unit but that they would not use the questions with students. Analysis of the unit question in the eleven completed unit plans indicates that most of the teachers (n=9) had developed a question that was relevant to the topic and activities in the unit, but only five of the teachers had questions that required students to reflect deeply on the content and draw connections to the world outside the classroom. The analysis of the 42 unit plans found that only 52% of plans had questions that met Criteria 3 to “require students to reflect on an issue that connects content information to the real world and to think critically to form an answer to a complex” (see Figure 12). We looked more closely at the units of the 12 interview participants.

Even though teachers described engaging and rich activities with the students, the written CFQs in the unit plans did not always align with what teachers and students did in the classroom. For example, a good unit question was “Does your past determine your future? How does leadership style impact society?” and the students explored how the consequences of the Holocaust shaped people's futures at an individual level and at a social level. But, more commonly, teachers had broad questions that did not require critical reflection as the unit questions: “Identify similarities and differences between words in Spanish and in English, including pronunciation, intonation, stress patterns, and simple written conventions of language”, “What is a Rainforest?” or “Why do objects move the way they do?”

Hallmarks of effective professional development

Finding 13. Participants credited the Essentials 10 training and unit plan process for creating an opportunity for them to experiment with new tools and teaching practices in their classrooms.

Eleven of the interviewees spoke about experimenting or trying out the new things they had learned in the training, using both the tools and pedagogical strategies. Participants felt that the unit plan they developed in the training was a way to bridge the gap between the theory presented in the training and the applied world of their classrooms. Participants reported that the training introduced them to new concepts and technologies; that the unit-plan design process helped them think through the pedagogical uses; and the unit plan guided them through actual experimentation in the classroom. For example, a kindergarten teacher commented that she first saw the unit plan template almost as a “worksheet” to fill out, but then realized that the course was the opportunity to think deeply about how the different teaching strategies and tools work together to promote learning and that the unit plan was the lynchpin to the whole process. This teacher was excited that the whole process would be topped off with the implementation with her students.

Some teachers used the Essentials 10 course as a chance to explore tools and teaching strategies that they had heard about but had not used, while other teachers delved into something that was

completely new to them. For example, one PT enjoyed developing a project-based unit, commenting, “I had done some projects but not as much because I had not been officially taught that. I had never designed a full unit based on project-based approach” (*Participant 11*). This teacher selected a unit he had done previously but which he thought would lend itself to being redesigned as a project with a technology component. The teachers who were excited to experiment with something completely new, mostly talked about the Web 2.0 tools.

Finding 14. Differences existed in what Participant Teachers had written in their unit plans and how they executed their units in the classroom. Generally, PTs were meeting more of the criteria during implementation than indicated submitted unit plan.

The improvements in teachers’ scores between the initial unit plan assessment and when the full implementation is taken into consideration suggest that the implementation is deepening teachers’ learning. Eleven of the Participant Teachers who were interviewed also submitted unit plans that were rated using the *Unit Plan Assessment Rubric*⁶. Eight of these educators took the face-to-face training and three took the hybrid course. The unit plans of these eleven teachers were initially rated using only the material presented in the unit plan itself. To ensure ratings were accurate and unbiased, a researcher who had not been involved in the interview was the primary rater of these unit plans.

After all interviews and unit plans assessments were complete, researchers discussed the unit plans of the Participant Teachers they interviewed and re-rated with the unit plans and the implementation. Researchers received more in depth and detailed information in the interviews than they could gather from analysis of the unit plan in isolation. Participant Teachers often created the unit plans in the workshop but used the classroom implementation as a chance to experiment and refine their units (see Finding 7). Thus the information received in the interviews was sometimes different or contradictory to what was actually written on the unit plan. There was also room in the interview to clarify points in the unit plan that were unclear or have educators discuss more around a certain point.

Many differences were noted when the original unit plan scores were augmented with interview data was considered (see Table 4). With only 11 unit plans being discussed, 26 points were added to the unit plan ratings, and only 4 were deducted. This was an average of nearly 3 differences per unit plan. 21st century skills showed the largest change with points added to every criterion. Criterion 2, students work collaboratively, and criterion 4, activities build ICT skills, both had the highest number of changes with four more units meeting those criteria (36% of the 11 unit plans discussed). The other criteria that also improved on four units (36%) was assessment criterion 2 which deals with the use of formative assessment to evaluate 21st century skills.

Table 4. Changes on each criteria when the interview data is considered in the scoring process. (n=11)

| | Unit plans that had this criteria added. | Unit plan that had this criteria deducted. |
|--------------------|--|--|
| Project Approach 2 | 1 (9%) | |

⁶ One interview participant submitted an incomplete unit plan.

| | | |
|-----------------------------------|-----------|------------|
| Project Approach 3 | 3 (27%) | |
| Project Approach 4 | 1 (9%) | |
| 21 st Century Skills 1 | 4 (36%) | |
| 21 st Century Skills 2 | 1 (9%) | -1 (9%) |
| 21 st Century Skills 3 | 4 (36%) | |
| 21 st Century Skills 4 | 1 (9%) | -1 (9%) |
| Unit Questions 3 | 1 (9%) | |
| Technology Integration 2 | 2 (18%) | -1 (9%) |
| Technology Integration 3 | 1 (9%) | -1 (9%) |
| Assessment 1 | 1 (9%) | |
| Assessment 2 | 4 (36%) | |
| Assessment 3 | 2 (18%) | |
| Total Point Changes | 26 | - 4 |

*Criteria not listed had no changes.

The comparison of the rubric assessment and the assessment of the actual implementation highlighted two points: 1) that the rubric cannot perfectly capture every aspect of a unit plan and 2) the unit plan may not fully indicate what will transpire in the classroom. Both points indicated that certain concepts presented in the training were difficult to translate onto paper in the unit plan. Teachers may also be writing only enough on the unit plan to remind them of ideas they want to implement, but their explanation might not be sufficient for an outside reader to fully comprehend the intentions of their unit plan; thus making it difficult to score perfectly on a rubric.

The fact that 21st century skills showed the widest change suggests that teachers found them difficult to describe or discuss within the context of a brief, written unit plan. Goldenberg & Strother (2006) found that teachers even had difficulty explaining how they scaffold 21st century skills in a full-length interview. There may be things that teachers intended to do to support 21st century skills that they were not able to clearly express in the written plan.

Finding 15. There was no statistically significant difference in unit plan quality between the face-to-face and hybrid formats of the course. There were small, non-significant differences, including the use of technology and providing detailed instructions being slightly higher in face-to-face participants' unit plans.

Analyses were run to compare the unit plans from the face-to-face trainings and the hybrid trainings by dimension and by each criterion. Overall, the average number of criteria met was higher for the face-to-face unit plans (mean=16.41) than the hybrid (mean=14.95), although this difference is not statistically significant. Similarly, the face-to-face version is higher on every dimension except project approach (see Table 3), but none of the differences reached statistical significance.

In the analysis performed at the criterion level between the two types of training, only the fourth criterion of 21st century skills that learning activities build information, media and technology skills through effective use of technology was significantly different, $t(40)=2.6$, $p < .05$.

Effective use of technology was defined as requiring students to communicate what they have learned through a technology-based product. The unit plans from the face-to-face training more often met this criterion (82% vs. 45%). Two other criterion were found to have marginally significant differences, $p < .10$: the second criterion of technology integration that students must revisit or use multiple tools and the second criterion of implementation that the unit plan has well thought out and detailed instructions and procedures. More face-to-face unit plans achieved both of these criteria. Figures AA - FF show a complete list of the percentages of unit plans successfully achieving each criterion, in total and separated by type of training.

Finding 16. The grade level of the targeted students did not affect the quality of unit plans.

Correlation analysis was run to determine if grade level was related to unit plan assessment scores. There were no significant correlations of grade with the unit plan total, dimension totals, or any individual criterion. This suggests that Essentials 10 can effectively support Participant Teachers at any grade level to create quality unit plans as measured by the *Essentials 10 Unit Plan Assessment Rubric*.

DISCUSSION

Findings from this study suggest that the new Essentials 10 course is an effective professional development experience that is successfully influencing teachers in promoting the use of new ICT tools and pedagogical practices. Participant Teachers interviewed reported that many of the pedagogical and technological aspects of the training were relevant and useful for their teaching. An analysis of the unit plans identified key concepts that teachers handled well and concepts that remain challenging. When interviewed, PTs explained how they took the unit plans they created, and what they had learned during the course, to effectively implement new technology and teaching strategies in the classroom. Teachers even explored the applications of the technology and pedagogy outside of their unit plan and had interesting developments upon application.

The newest aspect of Essentials 10 was the inclusion of Web 2.0 technology. Participant Teachers found this both exciting and challenging. Previous evaluation studies by EDC and SRI on Essentials 10 found that participants reported feeling lost or confused during the training in connection to the on line environment. The follow up interviews with participants offered another set of insights on teachers' experience during the training. A subset of teachers had positive feelings about the training as an immersion into a new, confusing environment that their students already know well – the networked world of Web 2.0.

A portion of the teachers interviewed had used a blog or wiki with their students and one of the aspects that stood out was the role the wikis and blogs played in the culture of classrooms and the social relations among students and teachers. The teachers interviewed had created class wiki sites that supported many different (or nearly all) student activities, and not just in relation to a single project. Teachers were using the wiki for students to post work, organize activities or to undertake activities that extending throughout the entire semester. The tools were used to help break down the classroom walls and to extend the students' and teachers' relationships outside the class. This suggests that the tools were being used to help create a richer learning environment, akin to some of the dimensions of a quality learning environment promoted in other Intel Teach programs.

In the end, however, over half of the PTs decided not to use wikis and blogs. Although district restrictions on certain websites were a factor, the interviewed PTs also reported their own concerns as a factor in deciding not to use the tools. Teachers had concerns about monitoring what students post, the appropriateness of the tools for their students, and not being able to use the tools effectively. However, most of the rationales of the teachers who did not use the Web 2.0 tools were based on misconceptions of the tool. For example, one PT stated that she was worried students would just post anything on a wiki including inappropriate content, unaware that she could act as a filter for all posts. Another concern was not being able to make content relevant threads on blogs, instead having to post chronologically which can be confusing; thread posting is possible with both blogs and wikis, so this comment came from inexperience. Participant Teachers may need more direct experience actually using the Web 2.0 tools before they implement them into their unit plans and classrooms.

Participant Teachers also implemented and valued the pedagogical strategies from the course, especially the new assessment piece. With over 80% of Participant Teachers incorporating

formative assessment and many attempting to assess 21st century skills in both formative and summative assessment, PTs are utilizing the ideas from the Essentials 10 assessment training. Despite the success encouraging formative assessment, there are remaining challenges in regard to assessing 21st century skills. Assessing 21st century skills was the most challenging aspect of assessment and is one aspect for which PTs may need more scaffolding.

Additional challenges with the pedagogical concepts identified in the rubric assessment results were: cooperative grouping and effective unit questions. Participant Teachers used grouping strategies in almost every unit plan but seldom explicitly addressed the issue of individualized roles in cooperative grouping. Curriculum Framing Questions continues to be challenging. Although the evaluation chose to only assess one level of CFQs, unit question was the most diversely scored subcategory on the rubric. Unit questions had a high number of 4's (33%) overall, but also had the highest number of 0's (12%). This suggests that many participants do not fully understand CFQs.

A final question addressed in this study was whether unit plans are an adequate measure of what teachers learn as a result of participating in Essentials 10. The rubric created by researchers was effective at rating whether the identified course priorities are adequately incorporated into the unit plan, but as the interview study suggested, teachers' lessons met more criteria in the classroom implementation than the unit plan itself may indicate. There may be multiple reasons for the difference between the unit plan and actual implementations: Participant Teachers may not have sufficient time to write out complex plans in full detail; they may also need time to fully digest all the new information and strategies and then develop strategies of how to best implement everything into the classroom; or they may need hands on experience to make adjustments and to elaborate their unit plans before, during, and after they try it in the classroom. Thus their unit plan right at the end of training may not accurately reflect exactly how well teachers have mastered the material or how they will implement the core aspects of Essentials 10 into the classroom.

The Essentials 10 Unit Plan Assessment Rubric and teacher interviews suggest many positive findings about the course, the unit plans, and how teachers are implementing the unit plans in the classroom. But, the most important idea may be that PTs need time to ponder, experiment, and adjust their unit plans, as well time and experience with Web 2.0 tools before they are fully comfortable and able to fully extrapolate how to use these concepts in other units, but the Essentials course and the unit plan are central to that process. PTs have a strong introduction to the concepts and a useful tool upon leaving the training, and are eager experiment with their unit plans in the classroom.

REFERENCES

Goldenberg, L., & Strother, S. (2006). *Teaching Practices to Support 21st Century Skills: An Evaluation of the Intel® Teach Program Thinking with Technology Course*. New York: EDC/Center for Children and Technology)

APPENDIX A

Essentials 10 Unit Plan Assessment Rubric

The following rubric was created to assess major points of unit plans created by Participant Teachers during the Intel Teach Essentials 10 professional development course. The rubric was created to mirror many of the self-assessment rubrics in the Essentials 10 manual. The elements represented are not intended to be all inclusive, but highlight six core dimensions that Essentials 10 emphasizes as teachers complete the course and create their unit plans. The purpose of the rubric is to identify how well teachers are building the unit plans with respect to these six subsections and their respective criteria. The criteria are also not exhaustive, but target four critical aspects of each dimension. Thus this rubric is not intended to comprehensively rate the overall quality of the unit plan, nor does it have any implication on how teachers may use their unit plans in the classroom.

Instructions for scoring

The rubric allows for each criterion to be assessed individually. On this rubric, each unit plan will receive six scores – one for each subsection. Each subsection calls for a unit plan to be rated on a 0 to 4 scale, receiving one point for each of the 4 listed criteria that are adequately met by the unit plan. Each unit plan is given a ‘1’ if the criterion is met and a ‘0’ if the criterion is not met.

This scoring process allows for the data to be analyzed in two ways: first at the criterion level; and also allows for analysis by each dimension by summing the 1’s for each subsection. The researcher can look across all the unit plans to examine what percent of unit plans meet each criteria, as well as estimate the strength of each dimension by the percent of unit plans meeting four, three or two criteria, etc.

Please be sure to read the specific directions in each subsection box – in the small gray scoring boxes as well as in the main box above the criteria.

| Project Approach | 4 | 3 | 2 | 1 | 0 |
|--|----------|---|--|--|---|
| | | The Unit Plan successfully meets the first criteria and all three remaining criteria. | The Unit Plan successfully meets the first criteria and two of the remaining criteria. | The Unit Plan successfully meets the first criteria and one of the remaining criteria. | The Unit Plan successfully meets the first criteria and none of the remaining criteria. |
| <p>Below are four key dimensions of a project based approach that an exemplar unit plan must explicitly discuss:</p> <ol style="list-style-type: none"> 1. The unit is an extended project that takes place over multiple sessions across two or more days. 2. Students are individually asked to assume active roles, complete different and interdependent tasks with students sharing responsibilities. The unit plan must <i>explicitly</i> address issues of student roles and collaboration. 3. The student tasks in the unit specifically make connections between the <i>content</i> that students are learning and things outside the classroom. 4. During the project, students are asked to demonstrate knowledge throughout ongoing activities that build towards a larger end product or project. The end product must be student-made and relevant to the unit's learning goals. | | | | | |

| 21st Century Skills | 4 | 3 | 2 | 1 | 0 |
|---|----------|--|---|---|---|
| | | The Unit Plan successfully meets all four of the following criteria. | The Unit Plan successfully meets three of the following criteria. | The Unit Plan successfully meets two of the following criteria. | The Unit Plan successfully meets one of the following criteria. |
| <p>Below are four 21st century skills that an exemplar unit plan must support:</p> <ol style="list-style-type: none"> 1. The learning activities invite students to think critically about the content and problem solve with research, analyzing information, and developing solutions or answers. 2. Students work collaboratively and communication is a necessary part of the unit plan activities. 3. The learning activities contain core subject content and connect it to applications outside the classroom. 4. The learning activities build information, media and technology skills through effective use of technology (beyond basic internet research). <p>*For more info: http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=254&Itemid=120</p> | | | | | |

| Unit Questions | 4 | 3 | 2 | 1 | 0 |
|---|--|---|---|---|--|
| | The Unit Plan successfully meets all four of the following criteria. | The Unit Plan successfully meets three of the following criteria. | The Unit Plan successfully meets two of the following criteria. | The Unit Plan successfully meets one of the following criteria. | The Unit Plan successfully meets none of the following criteria. |
| <p>Below are four key aspects of Unit Questions that an exemplar unit plan must meet: (NOTE: If there is more than one Unit Question listed, at least half should successfully meet each criteria)</p> <ol style="list-style-type: none"> 1. The Unit Question(s) is connected to the learning activities in such way that answering the question guides students through the activities or content covered by the unit plan. 2. The Unit Question(s) must be written in a way that requires students to delve broadly into the content to analyze information to form an answer. 3. The Unit Question(s) is an open-ended question that requires students to reflect on an issue that connects content information to the real world and to think critically to form an answer to a complex problem. 4. The Unit Question fits into the CFQ structure and meets <u>both</u> the following criteria: <ol style="list-style-type: none"> a) is connected to the Essential Question in such way that answering it will help students understand at least one aspect of the Essential Question. b) is a sufficient umbrella for the Content Questions. | | | | | |

| Technology Integration | 4 | 3 | 2 | 1 | 0 |
|-------------------------------|--|--|---|---|---|
| | | The Unit Plan successfully meets all four of the following criteria. | The Unit Plan successfully meets three of the following criteria. | The Unit Plan successfully meets two of the following criteria. | The Unit Plan successfully meets one of the following criteria. |
| | <p>Below are four key aspects of technology integration that an exemplar unit plan must meet:</p> <ol style="list-style-type: none"> 1. The selected technology-based tool(s) is used by students to do at least one of the following: <ol style="list-style-type: none"> a) Research b) Publishing, Presenting, Authoring c) Collaboration d) Communication skills (through paired or group work). 2. Students revisit at least one technology-based tool, excluding Internet research, across multiple periods or use multiple technology-based tools over the span of multiple periods. 3. Excluding Internet research, the selected technology-based tool(s) connect to subject content and help scaffold 21st century skills (<i>i.e. a PowerPoint or something more innovative</i>). 4. The Unit Plan incorporates at least one 'Web 2.0' tool used to support student learning from the Essentials 10 course: blogs, wikis, googledocs, social bookmarking. | | | | |

| Assessments | 4 | 3 | 2 | 1 | 0 |
|--|----------|--|---|---|---|
| | | The Unit Plan successfully meets all four of the following criteria. | The Unit Plan successfully meets three of the following criteria. | The Unit Plan successfully meets two of the following criteria. | The Unit Plan successfully meets one of the following criteria. |
| <p>Below are four key aspects of assessments that an exemplar unit plan must meet:</p> <ol style="list-style-type: none"> 1. The Unit Plan contains formative assessments that allow students and/or teacher to monitor progress towards completing the project. 2. The Unit Plan explains how the teacher’s use of formative assessments encourages 21st century skills and learning (collaboration, self-direction, content connections, etc.). 3. The Unit Plan contains at least one summative assessment that incorporates the learning process and 21st century skills . 4. The Unit Plan contains at least one summative assessment that is based on clearly written content-specific criteria, as such they should value content over design elements or production standards that might be involved in the student product. | | | | | |

| Implementation | 4 | 3 | 2 | 1 | 0 |
|---|--|---|---|---|--|
| | The Unit Plan successfully meets all four of the following criteria. | The Unit Plan successfully meets three of the following criteria. | The Unit Plan successfully meets two of the following criteria. | The Unit Plan successfully meets one of the following criteria. | The Unit Plan successfully meets none of the following criteria. |
| <p>Below are four key aspects of Unit Plan implementation that an exemplar unit plan must meet:</p> <ol style="list-style-type: none"> 1. Each section of the Unit Plan is completed with the appropriate content. 2. The Unit Plan has well thought out and detailed instructions and procedures. 3. The Unit Plan would be easy for another teacher to implement. 4. The Unit Plan has learning activities that are coherent and meaningfully sequenced and integrated. | | | | | |