Ballston Spa Central School District

Clean Technologies and Sustainable Industries Early College High School Program (ECHS)

ETHNOGRAPHIC STUDY

THE PAST FOUNDATION
access through innovation

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Section 1:
Background and Information

In fall 2011, the Ballston Spa Central School District opened the *Clean Technologies and Sustainable Industries Early College High School* (ECHS) at the Hudson Valley Community College TEC-SMART Campus, enrolling the first (25) students. The initial year of the program offered only 11th grade coursework to students in their third year of high school. The ECHS Program was launched by an innovative partnership between the Ballston Spa Central School District with the Hudson Valley Community College (HVCC) and the New York State Energy Research and Development Authority (NYSERDA). The success of the program is also building on support of a collaborative endeavor bringing business and industry, nonprofits, government and others in the region together to establish the "Early College High School" model for STEM education.

ECHS students are co-enrolled in high school and HVCC, and are offered the opportunity to earn both high school credit and college credit for courses completed, including hands-on lab work in clean energy technologies. All (25) students enrolled in the 2011-12 school year received Smart Scholars Early College High School scholarships from the New York State Education Department's Early College High School Grant. These grant awards provided financial support for costs of college courses offered to the ECHS students, who attended half-day sessions at the TEC-SMART campus that included both college and high school coursework.

During May 2012, nearing the close of the first year of the program, students, parents, teachers and program partners were asked to participate in an ethnographic study of the ECHS Program conducted by the *PAST Foundation Knowledge Capture Program*. The process involved voluntary participation in a survey posted online. The online survey remained open for over a period of (26) business days (April 23rd to May 21st). Concurrent to the online survey, a series of three separate focus group discussions were conducted at the ECHS facility on May 9th and 10th. Survey respondents included (21) students and (10) adults representing parents, teachers, and program partners. Focus group participation included (10) students and (7) adults from the three adult groups.

This report provides an ethnographic analysis of the focus group discussions. The analysis provides a measureable tool that presents the authentic voice of four specific stakeholder groups. The issues identified by students and adults during the focus groups comprise nine key thematic areas:

1. Expectations of the Early College High School (ECHS) Program
2. Differences between the ECHS and Traditional High School
3. College Readiness
4. Exploring Career Pathways
5. ECHS Learning Resources

6. Student Demonstration of Learning
7. Grading and Summative Assessment
8. Expectations for Year 2 of the ECHS Program
9. Teachers, Parents, Community and ECHS Program Partners

This report is organized primarily to consider themes in a systematic approach to issues identified during the focus group discussions, illuminating both the foreground perceptions and background structure of the ECHS. Section 2 presents a narrative discussion offering a brief analysis of each of the nine themes, and considers the linkages across the four stakeholder groups (students, parents, teachers, and partners). Section 3 consists of the "Bullet Point Report," which presents summary data points for each of the nine themes.

A comparative discussion of how the nine themes are reflected in the survey responses is presented in Section 4 of this report. The last section of the report, Section 5, explores a set of ideas that emerged in the focus group discussions and survey responses in the context of suggested changes or ways to expand and enhance the program in the 2012-13 school year and beyond.

Ethnographic Documentation and Analysis

The process of ethnographic research is structured to systematically document and analyze qualitative data derived from dialogue, written responses or observation of social interaction. In conducting this type of research the priority for anonymity is fundamental to ethnographic methodology that seeks to gain meaningful explanations of the experience of participants engaged in a common effort generally framed by shared cultural expectations and practices.

In the case of educational or learning communities, the context for study is typically the school itself, and is often focused on interaction among students, teachers, parents and the surrounding community. The PAST Foundation has successfully utilized ethnographic methods specifically to support the transition of K-12 students from traditional high school classroom instruction, to transdisciplinary problem based learning (T-PBL). These programs are designed to integrate multiple disciplines including science, technology, engineering and math (STEM).

T-PBL

Transdisciplinary Problem Based Learning (T-PBL) pivots on real world issues or problems that use projects to form solutions. T-PBL projects touch standards across all content areas recognizing the interconnected nature of knowledge and the underpinnings of language, culture, and design to all STEM learning.

The ECHS ethnographic study offers the opportunity to learn from the experience of the first year of implementation of the ECHS Program. The first year experience may be considered in terms of the types of challenges for the program participants that ranged from the way in which T-PBL promotes transdisciplinary learning, to gaining so-called "soft" skills associated with a problem solving context in which innovation, collaboration, communication and teamwork are essential elements of program

learning objectives.

Ethnography offers a systematic method to document and analyze the experience of individuals engaged in transitioning from what is familiar to what is unfamiliar in ways that will help to inform program design during ongoing stages of program development. The cultural changes that occur are also assessed as the program encounters milestones that are evident across programs and schools engaged in the transition to STEM education. The *Knowledge Capture Program* is able to apply the experience of learning communities engaged in this type of transition to help identify turning points or "game changers" that occur as the program develops and expands.

Ethnography also brings to light program participant insights about the program structure and the day-to-day experience of how implementation is being conducted. These insights can inform and help shape the evolution of the program, building on perceived program strengths, and targeting areas where real-time course corrections can modify program components to better meet program participant learning objectives and general program goals.

Anonymity of Study Participants

Each student and adult participating in the study received a written description of the project and a description of methodological protocols for conducting ethnographic research. The process involves obtaining a signed consent from each study participant at the onset of the research period. Additionally, students were required to obtain parental permission to participate in the study. Study participants have been assigned an identity code number used throughout all phases of research. Focus groups were audio recorded for fidelity to the discussion. Transcriptions of the focus group discussions were created from the audio recording and participants were identified by the assigned study code number only. Access to all research files is restricted to the *PAST Foundation Knowledge Capture* team.

Section 2:
Analysis of Focus Group Discussion Themes

Nine general themes were identified through ethnographic analysis of responses to a common set of questions (questions are presented in Appendix A). Within each of the nine themes, data points compiled into summary statements are presented to help further define the general theme. A total of 75 data points were identified by theme as follows:

Focus Group Major Themes	Data Points
1. Expectations of the ECHS Program	9
2. Differences between the ECHS and Traditional High School	11
3. College Readiness	6
4. Exploring Career Pathways	9
5. ECHS Learning Resources	8
6. Student Demonstration of Learning	5
7. Grading and Summative Assessment	8
8. Expectations for Year 2 of the ECHS Program	7
9. Teachers, Parents, Community and ECHS Program Partners	12
Total Data Points All Themes	75

Table 1: ECHS Focus Group Total Data Points All Themes

Table 1 shows a comparative level of interest for each of the themes, with one theme reaching a total of 12 data points (summary statements), and the lowest set at 5 data points. The following narrative discussion presents a brief analysis of each of the nine themes and considers the linkages across the four stakeholder groups (students, parents, teachers, and partners). The Bullet Point Report that follows the narrative discussion provides the complete set of summary statements with individual participant code citations. Code numbers are organized by group as presented in Table 2.

Stakeholder Group	Focus Group Code	Survey Code
Students	500	5000
Parents	200	2000
Teachers	400	4000
Partners	300	3000

Table 2: ECHS Group Codes by Stakeholder Group

Stakeholder Group Code Citations

Within each group code, individuals were assigned sequential code identity numbers (501, 502, 503, etc.). Study participant citations consist of the individual identity code number followed by transcript line number (e.g., 501-33), where the first number is the code number assigned to the individual speaker, and the second number refers to line 33 in the transcription document. This process for citing data from the focus group discussions provides a systematic reference to the original source, and also allows for a comparative understanding of how stakeholders hold similar views, or how they differ (e.g., only students held a particular view or by contrast, students and teachers both have the same view). Where a data point has multiple group identity codes, we can see how the groups experience the program in similar ways. Where a data point lists only one code, we can see the unique experience or perspective of an individual group.

The assigned survey codes are distinguished by a different code set increased by one digit, adding a zero to the focus group code set to create the survey group code as shown in Table 2. A comparative discussion of the focus group themes and survey responses is presented in Section 4 of this report.

Themes and Stakeholder Perspectives

Focus group discussion across all groups is organized by nine themes. Exploring the differences and similarities in perspectives within each theme across stakeholder groups is informative of the range of first year experiences in terms of expectations, and in ways that can help to evolve and expand the program to attain the vision and purpose of the ECHS Program.

1. Expectations of the ECHS Program

When asked about expectations of the program prior to entering the 2011-12 school year, only students cited the opportunity to earn college credits funded by a scholarship as an important part of their decision to enroll in the program. Students, parents and teachers all stated that the ECHS Program offered an opportunity to experience a different approach to learning that would include hands-on labs, and to acquire critical thinking and research skills in a more rigorous program of study.

One teacher cited the opportunity to "mentor" students, while two of the three teachers saw value in teaching students applied math and science in the context of "real world problems." Parents, teachers and one student noted the potential for job opportunities, and also that students would be exposed to different professional careers and gain important technology skills to support learning in a collaborative team context. Finally, two program partners saw the program in a broader regional context, anticipating the importance of growing the program for the region, increasing enrollment of high school students to include more school districts, as well as linking the program with important economic benefits for the region in meeting the workforce needs of growing clean technology industries.

2. Differences between the ECHS and Traditional High School

In looking at the first year of the program, there were a range of views about transdisciplinary problem based learning (T-PBL) and differences from traditional high school. Students alone viewed the value of T-PBL to enhance their experience in achieving learning goals as an integrated process linked both to completing a set of tasks leading to project completion, as well as to long-term goals leading to fulfilling future aspirations. Teachers and students noted that T-PBL allows students to direct their own learning in

ways that does not occur with "direct instruction" more typical of high school coursework. This includes gaining experience with collaborative learning and using different types of learning resources. Parents joined in their view with teachers and students in ideas about T-PBL and team learning and the challenge of acquiring the social skills necessary to work effectively with team members with varying abilities and level of commitment to completing assignments. One partner commented that the ECHS Program offers students a new model for learning based on transdisciplinary learning, integrating math and science, in more of a "tech" path to career development.

Students observed that ECHS coursework in part allows students and teachers to explore new topics together in a quest to conduct project-related research. Students also commented that their ECHS coursework is more difficult and made their traditional high school courses seem "much easier" by comparison. One teacher also noted that students have matured in their learning styles and in gaining critical thinking skills, and one parent commented that their student had demonstrated growth and independence.

In comparison, students commented that year 2 ECHS students should have a real interest in learning about sustainable industries, observing that some year 1 students who were not interested found it difficult to engage in studies of these areas as part of their required coursework. One partner and two students thought that student interest in sustainable communities and "saving the planet" was an incentive for some, while at least one student was surprised at how "green" the courses turned out to be.

3. College Readiness

Students remarked on the level of independent learning expected of them at the ECHS that includes an understanding that their instructors will not simply feed them the required knowledge for successful completion of the course. One parent and one teacher agreed that an essential aspect of a successful transition from high school to college involves changing the culture for students who must shift to independent learning. Improving study skills was identified by one partner and two students, linking this with issues of improving independent learning skills. Additionally, students observed that their parents must also shift in their willingness to allow students to be more accountable and independent, treating them more like college students.

4. Exploring Career Pathways

All teachers and one parent thought that giving students the opportunity to engage in direct dialogue about different aspects of a STEM work environment with STEM professionals would be beneficial for understanding STEM careers. Additionally, one teacher and one parent felt that students also gained a better understanding of the professional skills and talents required to support new technology development (e.g. Cisco Systems involvement in the school during the 2011-12 school year). Teachers especially thought student interaction with professionals from business and industry was far more effective in shaping student understanding of issues such as employer expectations than student response to the same information from the teacher's personal knowledge or experience.

Students identified the importance of establishing a good "work ethic" as an important aspect of becoming a STEM professional. They also commented on the value of learning to collaborate and work in teams and developing skills they consider essential for post-high school success. One teacher observed that gaining essential problem solving skills, research experience, as well as learning to clearly articulate

problems and potential solutions, are essential abilities for any profession.

Two students and one parent shared in the view that students were learning about certificates for potential summer jobs, and also thought that the TEC-SMART facility was attracting offers to students for summer internships. Partners familiar with the challenges of bringing young students into the work place (associated with liability issues) commented on the value of hands-on learning in TEC-SMART labs that gives graduating seniors an "edge" in competing for college-level internships. A final observation shared by one parent and two program partners regarded the importance of opening up STEM fields to female students and considered possibilities for bringing local women's professional groups to the school to explore potential support and mentoring opportunities.

5. ECHS Learning Resources

Of the eight data points identified in this section, seven were based on student observations on the use of technology (tech) and the Cisco Systems (CS) Tablet. One teacher commented that first-year ECHS students benefitted from seeing the process unfold for designing and implementing new tech resources, giving them a better sense of the complicated decisions and issues involved with introducing new systems. Also, on a positive note, many of the students felt that access to tech resources including issuing a laptop to every student at the start of the year has been an important factor to support collaborative work both during and after school.

However, the laptops were viewed as limited in their function, and therefore students felt frustration with barriers to more sophisticated tech applications as well as limits to their access and use of the internet. The latter concerned limits to use of "secure" district approved websites and student sentiment about the value of learning to assess data validity of online resources as an important part of becoming an effective researcher. Additionally, students commented that they were not able to support their project research needs only using the official school database, which is more suited to high school assignments at their home schools.

A major barrier to making the shift to the CS tablets was linked by students and one teacher to limited training in the use of the tablets. Some students described the tablet as not very "user friendly," and felt that it did not meet expectations set by the prototype that was demonstrated to students during early design stages of tablet development. Additionally, students identified the TEC-SMART building as a major resource for hands-on learning about the green design of the facility structure, stating that they hope that year 2 will allow for more exploration of the structure and design of the building.

6. Student Demonstration of Learning

Of the five data points in this section all but one were offered as observations from partners about the importance of student presentations in the community. In their view, direct communication by students to the community in diverse venues offers a very effective way to increase awareness of the value of the ECHS Program to the community as a whole. Additionally, comments about highly poised presentations by students to different audiences about ECHS projects and learning accomplishments is another factor in gauging the early success of the program. Students also commented that they were sometimes called upon to make impromptu presentations to visiting high school students and adults, effectively placing them in the position of being able to clearly communicate to others about the ECHS Program as a whole, as well as to describe their research and project goals.

Parents, on the other hand, face the challenge of understanding how T-PBL changes student behavior in terms of the shift to teamwork and collaborative work on projects, including online research necessary to a problem-solving process. One parent observed that when their student was engaged on the phone or online with fellow classmates it was often difficult to see the connection to homework. One student commented that it was challenging to convince their parents about the importance of communication with team members via internet or telephone after school as a critical part of completing project assignments.

7. Grading and Summative Assessment

Aside from a single comment on the timing of the math test, the balance of the comments in this section concerned strategies for grading team-based projects. The main issue cited with regard to the math test was described as a challenge for students who were not prepared for taking a test later in the year, separated in time from the actual instruction.

One teacher commented that the process for assigning students to teams changed over the year to combine teams based on factors such as "ability and performance." Students also noted that teams were eventually formed to include an assessment of an individual student's "willingness to work," noting the challenge of completing a project when not all team members were committed to getting the work done on time. One student thought positively about the opportunity for self-evaluation among each team, allowing students to evaluate "who did the work and who did not." One student also commented that "group testing," where each team debated the issues to come to the best answer, was an effective way for students themselves to see the knowledge gained from completing a project. Overall, students in the focus group felt that their grades had improved during their year at the ECHS.

8. Expectations for Year 2 of the ECHS Program

At least one student and one parent expected that tech resource issues would improve during the 2012-13 school year. Other areas touched upon aspects of student involvement with the new ECHS program. One teacher offered the view that unlike traditional high schools, the "team element" is strong in year 1 students. One parent observed that students seemed to have a sense of ownership of the ECHS Program and had grown together through their experience to feel "it's like their own family." In commenting about year 2 of the program, this same parent observed that students feel that this is "their baby" and that they have a sense of wanting to ensure that year 2 builds on year 1 achievements. Year 1 students readily offer advice for incoming year 2 students, saying that new students should recognize the important differences between high school and college-level coursework, and that they should also understand that they will have an important role to play in growing the success of the program as a whole.

Among the issues cited by students as important qualities for ECHS students to possess was a "readiness" to work in teams. This includes being prepared to socialize with each other regardless of home high school affiliation in order to conduct effective dialogue within a team context. Other ideas concerned the notion that students who are not interested in green jobs and clean technology should not enroll in the program, adding that required study includes things that are not necessarily exciting but essential to completing a project. First-year students also caution second-year students to be ready to "grow up," to learn how to work on their own.

From the perspective of program partners, one individual commented on the importance of maintaining

the “exuberance” and “excitement” of the program for new students, while another noted the value of high profile marketing to get the “success stories out” to the local home communities in the region.

9. Teachers, Parents, Community and ECHS Program Partners

Of the 12 data points in this theme, only one derived from a student comment about the value of community presentations, specifically noting that hearing “constructive criticism” was helpful to learning about the issues and topics explored in student projects. Regarding the role of the community, several observations were made by program partners about the importance of strengthening community awareness and understanding of the ECHS Program. Specifically it was noted that the broader community needs a clearer understanding of the ECHS Program and relationship to the growth of new tech industries and emerging economic benefits for the region. This includes STEM job growth that will likely benefit ECHS students as well as HVCC and other students throughout the region. Focusing on diverse community interests that are engaged in planning for environmental and sustainability challenges is also an important part of targeting connections between the ECHS Program and the global competition for growing clean tech businesses.

Additionally, program partners observed that building formal and informal partnerships is critical to the success of the ECHS Program. The Ballston Spa administrative staff, including School Board members, have effectively continued efforts to grow critical partnerships and build support from within the business community. An important feature of this effort is the continual need to engage STEM professionals by bringing them to the building through various events and functions opening doors to involvement that can maintain this important connection for students. The fact that many of the parents of K-12 students in the region are themselves STEM professionals is another dimension to explore, to encourage these parents to voice their expectations directly to teachers and principals about STEM career development for their own children. In so doing, they can broaden the message from the business community to focus on the multiple goals and benefits of the ECHS Program for the community.

One key challenge identified concerned the need for parents and others in the community to tackle the issue of the long-term sustainability of the ECHS Program. Partners stated that registration and course fees associated with co-enrollment at HVCC will eventually have to be borne by students and their families. Exploring possibilities for augmenting these direct costs may come from a combination of sources, including support from business or broader government and workforce development funding that can potentially lead to sustaining program costs in the long run. Finding the solution to assure the future sustainability of the program can help maintain critical access to STEM career pathways for any student who has the interest and the desire to prepare for a STEM profession.

SECTION 3:

Bullet Point Report

The nine major themes identified during focus group discussions are presented here with a subset of data points (summary statements) identified by group code. Code symbols have been added for each focus group category as follows:

❖ = 200/Parent
⌘ = 300/Partner
▷ = 400/Teacher
❍ = 500/Student

Summary statements followed by a series of speaker codes (e.g., ❖202-16, ⌘302-8a, ▷ 401-2, ❍509-327) indicate shared ideas or observations by the different groups in their views about the ECHS Program.

1. Expectations of the ECHS (n=9)

"It is our goal to transform college and career readiness by creating new pathways between K-12, higher education and business, supporting a culture and learning environment with the tools and resources necessary to acquire and create knowledge, collaborate, innovate and to connect students with higher education, the community, the region and the world."

- Joseph P. Dragone, Ph.D., Superintendent of Schools

- Students would build a career pathway through exposure to different career professions and consider their own particular interests and talents; have more access to jobs (❖201-12a, ❖202-30, ▷ 403-29; ❍510-8)
- Different approach to learning that is "hands-on," involving T-PBL, in an environment where students explore "critical thinking, and creativity," research, public speaking and gain an ability to articulate and solve problems (❖201-12b, 34; ▷ 402-20; ▷ 403-29, ❍502-6)
- Changing student perceptions about education through experiencing accelerated learning; having a different kind of learning experience than traditional high school; learning would be more challenging (❖201-12c, ❍502-16, ❍503-5, ❍504-7)
- Teachers would actively mentor students (▷ 401-2)
- Experience college level instruction to prepare for the transition to college; earn college credits with no cost (❍501-4, 14; ❍504-13)

- Access to technology to support an approach to learning different from traditional high school, including technology (tech) resources to support teamwork and collaboration (❖202-24, ▷ 402-22)
- Explore applied use of math and science in "authentic learning experiences" that deal with real world problems that exist in communities today (▷ 402-6, ▷ 403-8)
- Build the ECHS Program and open access to high school students throughout the region (⌘302-8a)
- Build the ECHS Program in ways that will help to meet the regional economic potential for STEM industry growth (⌘301-9a)

Expectations of the ECHS

I expected to take kids to another level with their engagement and understanding of current issues. With their public speaking skills, their ability to stand up and articulate a response, an intelligent response. The ability to take a look at a problem and understand [and ask] OK, is this a valid statement? What do I need to do to assess it? Where can I find information to do that, who do I need to speak to? To have those critical thinking skills by the end of the course. [402-20]

2. Differences between the ECHS and Traditional High School (n=11)

> *"Students are engaged in authentic, transdisciplinary learning experiences in a fully connected learning environment that embraces 21st century skills."*
>
> **- Early College High School Faculty**

- Students experienced a different type of learning environment that introduced them to project based learning and the challenge of working in groups, and as a team recognize that people have diverse interests, strengths and weaknesses, as well as learning how to work with differences in commitment to achieving project goals (❖201-142; ❖202-59, 141, 144; ▷ 402-58; ❍501-331; ❍503-330; ❍504-332; ❍509-327)
- T-PBL enhances a student's ability to see learning goals within the context of a set of integrated tasks, and to understand how learning goals link up with student goals for the future (❍503-298, ❍510-305)
- Project-based learning offers students the opportunity to contribute to their own learning that does not occur with "direct instruction"; students developed different kinds of skills including time management, collaboration, and using different kinds of resources to achieve learning goals (▷ 403-55, ❍501-447, ❍502-314, ❍503-315)
- ECHS courses are harder than traditional high school courses; ECHS writing assignments are more difficult and as a result, writing a two-page paper for a high school course is "much easier" (❍502-548, ❍504-297)
- ECHS students pursue a "tech path" versus the college path of traditional high schools; ECHS students are exploring the new model of education where T-PBL eliminates the barriers across different subjects (e.g., integration of math and science) (⌘302-62)

- ECHS courses allow students and teachers to explore new topics together, unlike traditional high school courses that are consistent in the lessons and tests by grade level from year-to-year (❍502-64)
- Students are expected to independently learn math as part of conducting research for a project (❍504-89)
- Students matured in their learning style and considered the program a positive experience, although they struggled with the process of becoming critical thinkers (❖201-179, ▷ 402-60)
- Students who were not deeply interested in learning about sustainable industries and clean technologies were not as engaged in their studies as those who choose the program to pursue those areas of study (❍501-367, ❍504-368, ❍509-364, ❍510-360)

Differences between the ECHS and Traditional High School

I think the students in project based learning see a lot more ownership in the learning. There is just so much more student input, they get the chance to become experts in certain areas with in their groups...And I think that's been really fun for them to see that they can become an expert in a certain area. They can play a leadership role, they can become the public speaker. So I do think it changes up how they view themselves as a learner. [403-55]

- Some ECHS students were surprised at how "green" their coursework turned out to be (❍501-49)
- The context for learning is about the future and that is important and beneficial for ECHS students; students are learning to use math and science in real world applications to gain understanding of important challenges and potential solutions essential for sustaining communities; learning about green jobs for the future and ways to "save the planet" (⌘302-27, 50; ❍501-103; ❍502-104)

3. College Readiness (n=6)

"The Early College High School model was designed focusing on college readiness; all aspects of this program give students the skills necessary to successfully transition to higher education."

- Laurel Logan-King, Assistant Superintendent of Curriculum, Assessment and Pupil Services

- Changing the "culture" learned through 10th grade is a challenge for most students who are accustomed to memorization and test taking for right and wrong answers, but necessary for students "to make the leap" [from high school to college] (❖201-68, ▷ 403-65a)
- ECHS courses offer a better opportunity for motivated students to prepare for college and see themselves as college students (❖202-16; ❍ 501-100,348; ❍502-290; ❍503-304; ❍504-358b; ❍510-98)
- Students are encouraged to "dig deeper" into new subjects, attaining an intellectual approach to learning and understanding that has helped to make the shift to doing college level coursework (❍505-319, ❍506-295, ❍507-309)

- ECHS instructors expect students to conduct independent research and write a 15-page paper, and not rely on the teacher to provide everything the student needs to know about a given topic; teachers provide the resources to find answers to questions, and to consider different perspectives on issues (❍501-65; ❍502-64, 354; ❍503-313, 317; ❍504-61, 99)
- Students had to improve study skills in order to attain college course expectations for independent learning and to "be prepared for class based on the syllabus, the text and lectures"; students learned that independent study is different than class work and important to their own learning process (⌘302-42, ❍503-382, ❍505-378)
- Parents also need to shift in their role to give students more independence and freedom to learn to assume responsibility for completing their work as part of their transition from being a high school student to college student (❍502-432; ❍503-455, 462; ❍504-456)

College Readiness

[Teachers] don't really give us the answer; they give us the resources to find the answer. [501-65]

This program kind of taught us that you have to do things yourself. You have to teach yourself, learn things yourself. Learn how to get information yourself. [503-317]

4. Exploring Career Pathways (n=9)

"Students are given the opportunity through our partners in industry to investigate the emerging technology career opportunities in our region."

- Mary Burke, Director of Special Programs, NYSERDA

- Students were exposed to different career professionals that would not have occurred in traditional high school including the Cisco Systems professional team that worked on developing new ECHS technology; students also saw the range of professions involved with the Cisco effort to see that it takes more than engineers to support new technology design and implementation, including marketing and other aspects of product development (❖203-30b; ▷ 402-38c, 40)
- STEM professionals provided the opportunity for ECHS teachers and students to engage through informal Q&A in learning about different STEM professions; speakers were able to share aspects of the professional world including employer expectations, and were able to engage students in gaining an understanding of the work world in a different way than teachers, even those with experience outside academia (▷401-43; ▷ 402-38a, 44; ▷ 403-41)
- Learning to collaborate with one another is important and improved during the year; collaboration helps students to develop skills that are essential to success after high school, when you need to know how to work with different individuals, and to understand the importance of a "good work ethic" (❍503-105, 345; ❍504-321, 358; ❍507-346; ❍509-324)
- Students have a better understanding of how to earn "certificates" and ways to become more "marketable" in the sustainable energy clean technologies job field; students learned about different certifications and possible summer jobs open to high-school age students (❖201-48, ❍503-510, ❍506-509)

- Students are enthusiastic about "saving the environment," learning about sustainable industries, and thinking about the future of these industries and ways to be involved (❖201-50, ⌘302-50, ❍502-104)
- Media reports of the TEC-SMART facility and ECHS Program has increased interest by local businesses in offering summer internships for ECHS students (❍503-515, ❍506-516)
- No matter what field a student pursues, learning to define a problem and identify a potential solution, and communicate that to decision makers using qualitative and quantitative research are valuable skills; this is a difficult shift for students who have come from a traditional high school learning environment (⌘302-27, ▷ 403-65b)
- Creating hands-on learning experiences is a more effective way for high school students to explore different careers due to the liability constraints of having high-school age students in the workplace, making internship programs difficult to implement; hands-on experience gives younger students an edge in seeking summer jobs and college-level internships (⌘301-38, ⌘302-39)
- Exposing young female students to the STEM professions and possible careers is an important element of the ECHS Program (❖202-18, ⌘301-52, ⌘302-46)

Exploring Career Pathways

The other skills that I think are critical for businesses [are] the softer skills that these students are learning and the way that they're learning it that they may or may not learn at other schools. You're talking about the teamwork that they're doing, the ability to think critically, the ability to problem solve. Those are exactly what you hear the businesses say they need. [302-27]

It's dealing with real issues that affect us, and will affect us the future. [502-104]

5. ECHS Learning Resources (n=8)

"In education today, the ready access to technology is equivalent to a 21st century education."

- Jim Lovett, Coordinator of Instructional Technology

- Providing laptops initially for all students was viewed as a positive element of the program to assure that all students could access technology (tech resources) both during and after school, although some students felt that the laptops offered limited functional use (▷403-94; ❍501-135, 176; ❍502-173; ❍503-169; ❍505-154; ❍506-174; ❍507-168)
- The process of integrating the use of tech resources to support learning goals introduced students to the Cisco Systems (CS) process for designing new technology, the "CS tablets," involving students directly in considering best uses of technology (▷401-36b)

- The CS tablet prototype was initially expected to perform specific tasks to support student collaboration on projects and enhance communication between teachers and students, but the first generation of the tablets was not "user friendly" and consequently students and teachers continued to use the laptops (❍501-223, ❍502-145, ❍503-227, ❍504-146, ❍507-228, ❍509-195, ❍510-136)
- Training to support use of the tablets was insufficient for students and teachers who elected to continue to use the laptops throughout the year to support project work rather than switch to the CS tablets (▷402-96; ❍502-198; ❍503-140, 216; ❍506-220; ❍510-199)
- Use of "convenient" internet resources that are reliable (e.g., Facebook) is preferred by students over resources that are "not convenient" (e.g., Sakai) and therefore were not used to solve the problem of communication outside of school to collaborate on project completion (❍501-180, ❍502-178, ❍503-189)
- Access to internet resources was limited to secure sites; students felt they did not have the "freedom" to fully explore the web to conduct their project research; some students observed that learning to identify reliable data is part of the learning process of considering the validity of a source (e.g. an agency website such as the US Environmental Protection Agency versus a blog site) (❍502-287, ❍503-288, ❍506-161)

ECHS Learning Resources

Technology is a nice equalizer. I know we have students that without some of the school issued technology tools, they wouldn't be able to do the work at home. They just don't have access to the resources. And other students have obviously much better personal equipment than the school could ever issue them, so there's really that gamut in the access to resources. So I think this is one way where we can say, we're going to equalize your access to education and learning and provide you all with this tool. And I think that that's a really valuable thing too. [403-94]

- Students were given instruction in use of the school database to support project research; some students found the database adequate to support traditional high school assignments, others thought the database lacked the type of information necessary to fully support ECHS project research needs (❍501-274, ❍504-278, ❍510-275)
- Students viewed the labs and the design and structure of the ECHS building to offer the opportunity for "hands-on" learning about energy efficiency and the future design of structures (❍501-46, ❍510-42)

6. Student Demonstration of Learning (n=5)

"Through design focused service learning, students are engaged in transciplinary problem based learning, allowing them to demonstrate mastery in content, ingenuity, innovation and critical thinking."

- Diane Irwin, K-12 Science Coordinator

- Students have demonstrated their ability to make presentations about the ECHS Program, to communicate about their projects, learning goals and achievements to parents as well as to members of the community (❖201-130, ⌘302-8a)

- Student interaction directly with community members through their project presentations has helped to build community understanding about the ECHS Program among elected officials, business leaders, environmental leaders and local government; these presentations can be more effective than local media in conveying the accomplishments of the program (⌘302-24)
- Students have demonstrated critical thinking, problem solving and their ability to work collaboratively, all of which are skills that members of the business sector say are needed in today's workers (⌘302-27b)

Student Demonstration of Learning

The one project that comes to mind is the transdisciplinary project they worked on, the study of population growth on a watershed area. They went out in the field, did the study, put together some analysis of that study, and then came back and presented the study to business leaders, to environmental type leaders, to the heads of the different municipalities. So this was the kind of thing that I saw where this kind of program can get a lot of good notoriety. Not only from what's in the newspaper that not everybody reads, but from that direct interaction with the students. [302-24]

Student Demonstration of Learning

When I asked them questions about [the project] they could articulate what they did and how they arranged it. So it took planning, it took forethought, it took design, there was a lot of different components—art—to pull it off. And I thought it was great. Because you get the creative juices flowing, you've got to put them together to a certain path, not random. It's got to be a certain path. A path to complete the project, and I think that will definitely help the students going forward into college. [201-130]

- Students were able to speak to visitors with or without prior notice, including students from other schools and adults from STEM professions, to clearly articulate information about their projects and learning objectives (⌘302-62, ❍501-267, ❍506-268)
- Parents did not understand the difference between traditional high school homework and how T-PBL homework is conducted, and left students to convince their parents that talking on the phone or being online was an important part of working collaboratively with their team to complete their projects (❖201-86, ❍504-459)

7. Grading and Summative Assessment (n=8)

"It's critical to 21st century education that we provide support and guidance for teachers to facilitate students' abilities to become self-directed learners."

- Laurel Logan-King, Assistant Superintendent of Curriculum, Assessment and Pupil Services

- Math instruction and math tests were separated in time, and some students described the test as "hard to take" (❍504-78)
- The first project was based on assigning a "pair of students" to work together and grades were based on individual performance (❍501-374a, ❍503-373)

- Initially, project group assignments were made at random by the teachers, and some students found this frustrating because of differences in "work ethic" among different individuals; as the year progressed, teachers began assigning students to their project team based on "a willingness to work" (❍502-333, 337; ❍504-336, 343; ❍506-375)
- Assigning students to groups changed during the year as teachers recognized that grouping students by "ability and performance" would allow high performing students to continue to advance, and would also trigger more engagement from low performing students who had shown less interest in completing project assignments earlier in the year (▷ 402-66)
- Later in the year teachers asked students to self-evaluate, giving team members input on assessing "who did the work and who did not" (❍501-374b)
- Projects graded by "group testing" was an effective way to demonstrate what was learned, allowing students to engage in a debate with their team members to determine the best answer (❍504-428)

Grading and Summative Assessment

It's hard because sometimes you do know the answer but they need to figure it out and I need to let them make mistakes. And you guide them in the right direction [402-66]

I love group testing, because then you can test what you've learned against others. And if you're wrong and they think they're right, and you guys can argue about why you think—then you have to come to a conclusion about which answer is actually correct, so then you're going to get a better grade. [504-428]

- Some students said their grades improved at the ECHS Program (❍502-394a, ❍503-294, ❍504-293)
- Students displayed "maturity" in attaining critical skills, commitment to learning and in showing responsibility in preparing for engagement during year 1 of the ECHS Program (❖20-142, 179; ▷402-60)

8. Expectations for Year 2 of the ECHS Program (n=7)

"To become a stronger learning community across K-12, higher education and business and industry, we must share best practices in teaching and learning."

- Joseph P. Dragone, Ph.D., Superintendent of Schools

- Tech resources will improve and will meet student and teacher needs for collaborative project development and completion (❖202-24b, ❍501-216)
- Maintaining the "exuberance" of the program for new students entering in the second year is a high priority; new students coming into the second year of the program should have the same opportunities to experience excitement about the courses offered in the program (⌘301-59)
- First year students feel an "ownership" of the ECHS Program and have a feeling that "it's like their own family"; there is a sense of wanting to protect the program to see it grow in the right way, "they think this is their baby now, and are very close"; "there is a team element now that you don't see" [in other schools] (❖201-169, ❖202-165, ▷402-166)

- Growing the program in year 2 will require marketing, "continually getting the success stories out"(⌘301-76)
- Year 2 students entering the program should be prepared for teamwork and should have a commitment to engage in a collaborative process to work together as a group beginning with the very first project of the year; socialization with fellow students is an important part of the program, and a readiness to engage in dialogue as part of the experience (❍503-549; ❍504-109, 553)
- Year 2 students entering the program should be prepared to study areas that they are genuinely interested in, and commit to working hard in class, stay focused on their studies, and maintain timely progress toward project completion (❍501-367; ❍503-340; ❍504-339, 368; ❍509-364; ❍509-545; ❍510-338, 360)

Expectations for Year 2 of the ECHS Program

The group here, it's like they're their own family here now. [201-169]

Get ready to be able to socialize and ask questions, and you're definitely going to have to ask a lot of questions. [504-153]

- Year 2 students should be prepared to focus fully on their studies, including aspects that are less exciting, but that have to be researched in order to complete a project; independent learning is expected of college students and therefore ECHS students must be prepared to "grow up in a sense," to learn how to work on their own (❍503-551, ❍506-550)

9. Teachers, Parents, Community and ECHS Program Partners (n=12)

"Business has stepped up to take a leading and meaningful role in building a collaborative strategy for sustaining a 21st century education system that prepares our students for the real world."

- Mary Burke, Coordinator of Special Projects, NYSERDA

- The community has a general awareness of the educational importance of math and science, but little understanding of the types of jobs and skills that are needed for today's job market (⌘301-26)
- If we are going to be globally competitive it is important that the community, including parents and others, gain an understanding of the real world application of math and science and how the ECHS Program will advance these abilities in students (⌘302-27a)
- Students value the response they receive from presentations to the community, including the constructive criticism that helped them to learn more about their projects (❍501-414)
- School Board members and many of the program partners have been very "supportive" of the program and have engaged in fundraisers and other program activities; teachers also played an important role in advancing the program during the first year of program development (⌘302-13)
- The "high school in the college" model is gaining interest from the academic community and is being supported by the community college (⌘302-15)

- Community college partners can provide linkages to the "pulse of the community" including the business sector, and can support a direct connection between the college and workforce development for the ECHS Program (⌘301-60)
- The partnership between business and education is in part supported by the creation of the Luther Forest Tech Park, which will serve not just one school district or school system, but will engage regionally with the surrounding 13-county area (⌘301-29a)
- Parents also have a role to play to collaborate with teachers to support the transition for students to a different type of learning environment (❖201-169)
- Parents and other community members are going to have to determine how best to sustain the costs of the ECHS Program, including identifying important elements of the program that will draw support from the business sector; leadership from the business sector has emerged and can be an important trigger for state and local government support for growing the ECHS Program (⌘302-80)
- Building partnerships is a high priority for the ECHS Program and is being actively pursued by ECHS staff who are effectively helping to educate the Malta business community about the ECHS Program (⌘301-23)
- Bringing the business community to the school to learn about the ECHS Program is an important way to communicate opportunities for STEM professionals to get involved; this is especially important for STEM professionals who are also parents, and who may engage with the ECHS Program as a way to support their own parental expectations for high quality education open to their own son or daughter (⌘301-31, ⌘301-29b)
- There is a different response by teachers and administrators to parents who are also STEM professionals interested in STEM-based education; parents who communicate their expectations for access to T-PBL and STEM education for their children have more of an impact than business leaders who can be perceived to be "dictating [their needs] to education" (⌘301-34)

Teacher, Parents, Community and ECHS Program Partners

The cost of the program is going to grow and we have to find ways to make sure the money follows it. And that's to me one of the big things. And I think that the businesses are way ahead of the curve, they're going to accept this. They're going to see the value of this. [302-80]

SECTION 4:

A Comparison of Survey Responses with Focus Group Themes

The online survey was conducted during April and May of 2012. A total of (21) students and (10) adults (including parents, teachers, and program partners) participated in the survey (see *Appendix B: Survey Questions by Stakeholder Group*). The discussion in this section considers the survey responses in terms of the nine key focus group themes. In order to explore a comparison between the survey responses and the focus group discussion themes, the ethnographic data was quantified in terms of the number of statements made by individuals for both survey respondents and focus group participants.

The following figures present the nine themes for each stakeholder group. Each stakeholder group is shown in two sets that provide a comparison between focus group statements and survey statements as follows: Students (Figures 1A and 1B); Parents (Figures 2A and 2B); Teachers (Figures 3A and 3B); and Partners (Figures 4A and 4B). The number of participants in the Focus Groups and in the Survey differed by stakeholder group; however, we can compare the total statements for each group as a whole, and consider the percentage of statements relating to a particular theme for each stakeholder group. The figures show statements made as a percentage of total statements for each group, broken out by theme.

Comparing focus group statements with survey respondent statements is an important way to identify the differences and similarities among people's views as they explore issues using different approaches. The focus group dialogue on common experiences stimulates ideas in response to participant statements that are probative and add richness to the discussion. The survey presents the responses given by individuals where their views are based solely on their individual experience, and therefore provides a different type of understanding across the group. The focus group dialogue is a process for gleaning a deeper view of issues through "cross talk" that can lead to new perspectives that are nonetheless relevant and genuine. The survey is limited by the individual's own ideas and views, with no opportunity to probe beyond the initial response. However, the value of gaining the individual voice of the survey respondent provides meaningful data at the micro level, while focus group dialogues can generate understanding at the macro level.

Considering the differences and similarities between the focus group statements and survey statements provides different lenses to build our understanding of the first year of the ECHS Program. Each offers a complementary perspective that helps to fill in the picture of the ECHS year 1 experience.

LEGEND:

1. Expectations of the ECHS
2. Differences between the ECHS and Traditional High School
3. College Readiness

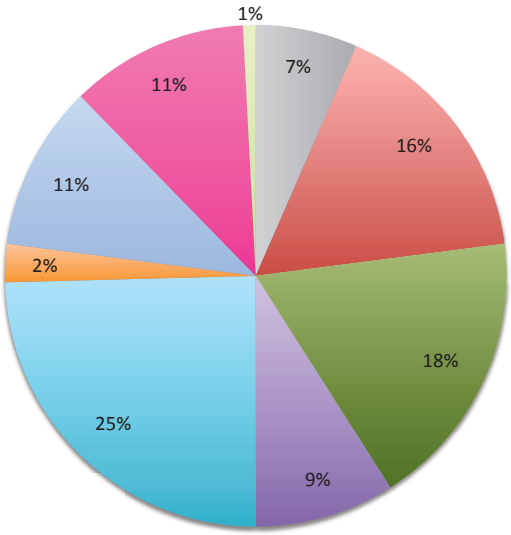


FIGURE 1A
Focus Group Statements by Theme: Students (N=113)

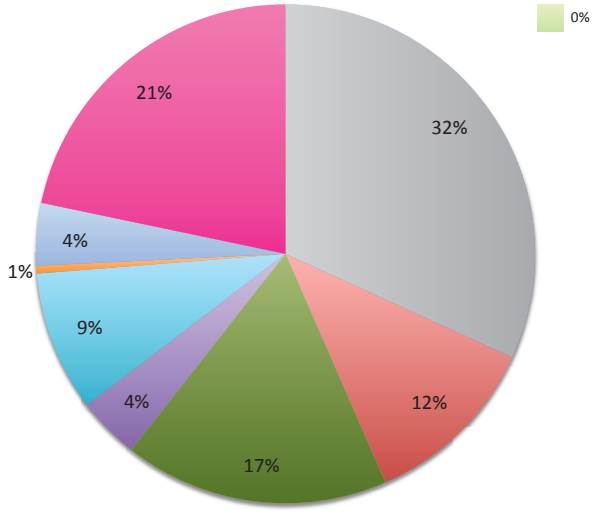


FIGURE 1B
Survey Respondent Statements by Theme: Students (N=198)

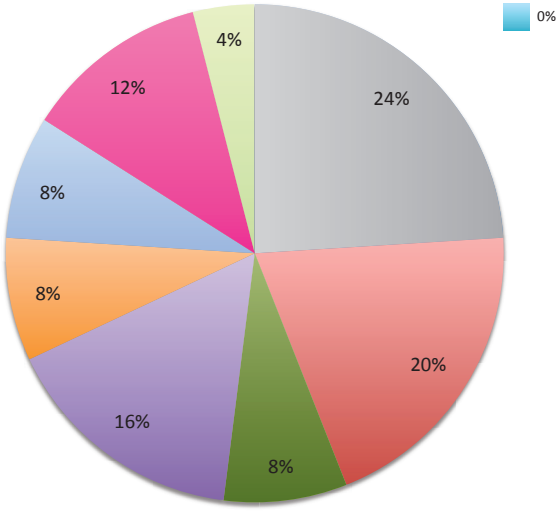


FIGURE 2A
Focus Group Statements by Theme: Parents (N=31)

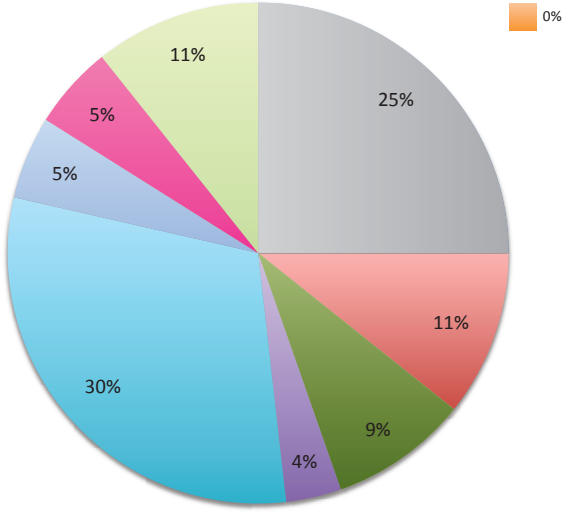
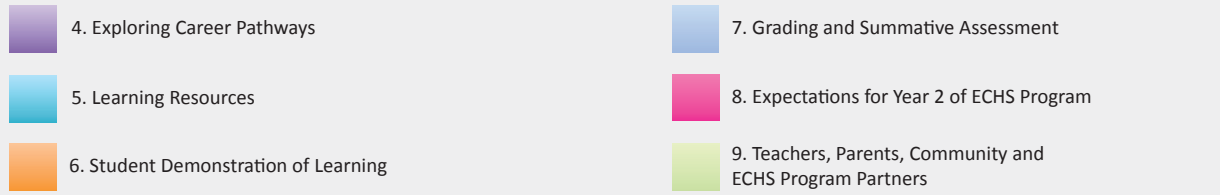


FIGURE 2B
Survey Respondent Statements by Theme: Parents (N=56)



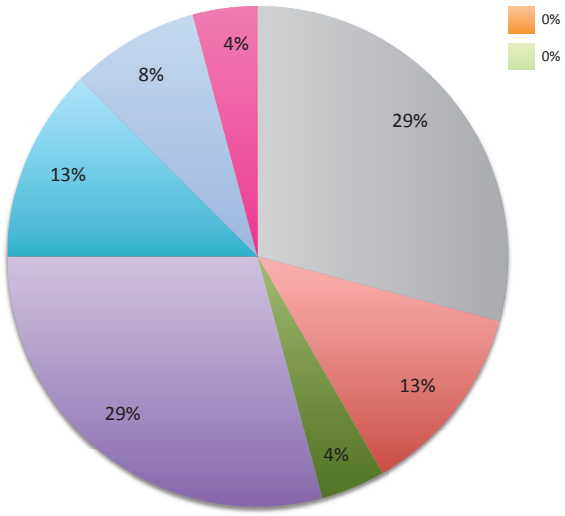


FIGURE 3A
Focus Group Statements by Theme: Teachers (N=22)

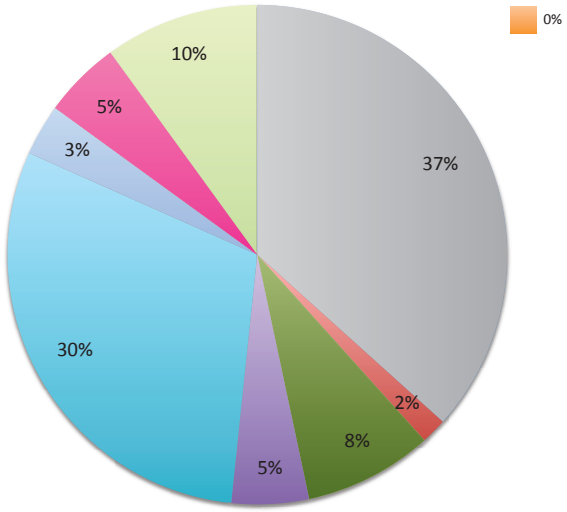


FIGURE 3B
Survey Respondent Statements by Theme: Teachers (N=60)

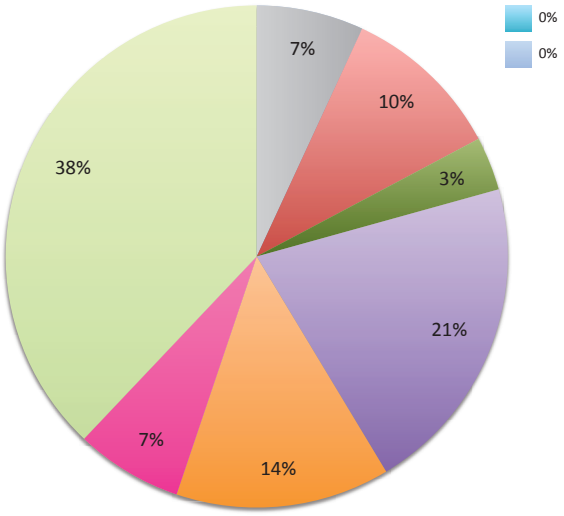


FIGURE 4A
Focus Group Statements by Theme: Partners (N=27)

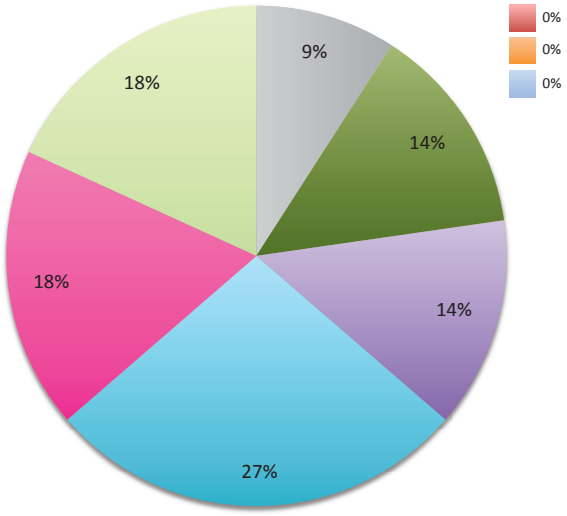


FIGURE 4B
Survey Respondent Statements by Theme: Partners (N=22)

Table 3: Focus Group Statements by Key Theme, and *Table 4: Survey Respondent Statements by Key Theme,* display a comparative view of statements between the two statement sets for further exploration. The tables are organized to show the percentage of statements broken out into three categories for each theme: 1) percentage that are ≥16%; 2) percentage that are 10-15% of the total statements made for that group; and, 3) percentage of statements that are <10%.

These tables can be explored in terms of the strength of the different methods to explore themes related to program design and substance (themes 1, 2, 5, 7, and 8). The second theme grouping could be considered to reflect the external or broader set of issues that relate to the community and future goals for student college and career development (themes 3, 4, 6, and 9).

Tables 3 and 4 also offer an account of the differences by stakeholder group between survey responses and focus group issues. For students, the breakdown of themes by percentage shows that the focus group discussion reached a broader spread across all themes, with (theme 2) differences between the ECHS and traditional high school, (theme 3) college readiness, and (5) learning resources falling into the top category (≥16%). The survey themes that fell ≥16% included a focus on (theme 1) the program itself and expectations for year 1 and (theme 8) year 2, as well as (3) college readiness. It is interesting to note that the focus group set shows a much lower interest in what students expected for year 1 (<10%) as compared to the survey (≥16%). Exploring career pathways (theme 4) also drew more interest among focus group discussants (10-15%) than it did for survey participants, where it fell to the lowest category (<10%). Interest for survey respondents in the role of the community partners and others in the community (theme 9) elicited no comments. Across all stakeholder groups, only students ranged high (≥16%) in their interest in (theme 3) college readiness in both the focus group and in the survey.

Parents in the focus group tended toward a greater interest in their views on the differences between their child's experiences in traditional high school and the ECHS (theme 2), and career pathway opportunities (4). Both survey respondents and the focus group discussants considered their expectations of the program as an important topic falling to the highest category for both sets (≥16%). Four of the nine themes fell to the lowest category for focus group participants, while five of the nine themes fell to the lowest for survey respondents, including college readiness (3) and exploring career pathways (4), with no comments on student demonstration of learning (6). In comparison, exploring career pathways (4) was a high area of interest for the focus group (≥16%), while college readiness fell to the lowest category for both the focus group participants and survey respondents (<10%).

Teacher's statements concerning career pathways (4) present a striking difference with the focus group percentage at ≥16%, and the survey statements falling to the lowest percentage (<10%). It is also interesting that teachers did not comment on the role of the community in the survey (theme 9), while the percentage of their statements about theme 9 reached 10-15% in the focus group.

Partners present a focus in their survey responses on ECHS learning resources (theme 5), expectations of year 2 (theme 8) and the role of the community and partners (9) as most important aspects reflected in the focus group discussion (≥16%). Additionally, the partner focus group statements reflect observations on the value of student demonstration of learning (6) referring to the importance of presentations to the community (10-15%), with no comments made by survey respondents on this aspect of the program.

Table 3: Focus Group Statements by Key Theme

Theme	Students (1A)			Parents (2A)			Teachers (3A)			Partners (4A)		
	1	2	3	1	2	3	1	2	3	1	2	3
1. Expectations of the ECHS			●	●			●					●
2. Differences between the ECHS and Traditional High School	●			●				●			●	
3. College Readiness	●					●			●			●
4. Exploring Career Pathway		●		●			●				●	
5. Learning Resources	●				●			●				Ø
6. Student Demonstration of Learning			●			●			●		●	
7. Grading and Summative Assessment		●				●			●			Ø
8. Expectations for Year 2 of the ECHS Program		●			●				●			●
9. Teachers, Parents, Community and ECHS Program Partners			●			●			Ø	●		

Table 4: Survey Respondent Statements by Key Theme

Theme	Students (1B)			Parents (2B)			Teachers (3B)			Partners (4B)		
	1	2	3	1	2	3	1	2	3	1	2	3
1. Expectations of the ECHS	●			●			●					●
2. Differences between the ECHS and Traditional High School		●			●				●			Ø
3. College Readiness	●					●			●		●	
4. Exploring Career Pathway			●			●			●		●	
5. Learning Resources			●	●			●			●		
6. Student Demonstration of Learning			●			Ø			Ø			Ø
7. Grading and Summative Assessment			●			●			●			Ø
8. Expectations for Year 2 of the ECHS Program	●					●			●	●		
9. Teachers, Parents, Community and ECHS Program Partners			Ø		●			●		●		

1 = 16% or higher; 2 = 10-15%; 3 = 9% or lower; Ø = no statements

A final brief discussion on the issues that emerged in the survey statements, which fall outside the nine key focus group themes, also informs our understanding of the overall themes. However, these are few in number and can be best understood in relation to three survey questions.

In response to the question concerning the difference in the types of interactions between traditional high school and the ECHS, teachers noted that the transdisciplinary learning environment allowed for better and more open communication between the teachers (4001-8a, 4002-8, 4003-8), and better interaction and closer insights on students (4002-8, 4003-8). In response to the same question, students responded that they felt that there is more open discussion with their ECHS teachers (5003-8, 5004-8, 5005-8, 5008-8, 5012-8).

In response to the question concerning career pathway exploration, students reported that a closer relationship with ECHS teachers allows them to incorporate their thoughts and questions about career options when interacting with teachers (5004-16, 5016-16). Finally, in response to the question concerning potential disadvantages in the use of technology for students, one partner responded that student focus on technology could possibly lead to less emphasis on building verbal communication skills (3001-11).

The few differences between the focus group themes and those identified in the survey responses confirms that overall both instruments offer valid insights that can support documenting the experience of ECHS participants. The potential for defining these issues more fully may be achieved through the focus group process as it provides the opportunity to gain greater understanding of the defining themes and aspects of the program offering potential for growth. The survey may be important as a tool to validate participant views as a measure of change over time, with the opportunity to develop targeted focus groups to probe more carefully into specific elements of the program where warranted in ways that will benefit program design in the future.

Section 5:

Recommended Actions for the ECHS Program

Table 5: Early College High School Recommended Actions presents four main categories identified in the analysis of focus group discussions and survey responses. These action categories are built upon the nine focus group themes. The categories include:

- Transition from Traditional High School to the ECHS Program
- Communication
- Program Structure
- Student/Teacher Support

Table 5 presents a comparative view across all stakeholders, showing common concepts among stakeholder groups on ideas to modify existing program elements, or to add new program components that can help meet perceived needs for the second year of the program. While many of the recommended actions are short-term and primarily concern year 2 of the program, others contribute to building the long-term structure and design of the ECHS Program as it grows to include students from multiple school districts in the coming years.

Beyond the four categories identified in Table 5, two important areas identified through focus group discussion concerned fundamental challenges for students and parents as students transition from high school to college through the ECHS Program. Students voiced their views on issues related to constraints they experienced in their first year of the ECHS Program. The first concerns internet use for research and communication by ECHS students. The second involves parents' perceptions about student use of technology as a learning tool.

The common thread across these issues relates to the expectation that students will develop particular skills through T-PBL that leads to independent learning, critical thinking, and taking responsibility for meeting learning objectives. ECHS students are expected to use technology to support collaborative work both during and after school. This involves development of skills necessary to support self-directed research and independent learning essential to T-PBL.

In particular students expressed their views on barriers created by school district internet use policies that are designed to limit middle and high school students access to secure websites. An unintentional consequence is that ECHS student research is controlled to allow access only to use of the official school district database (❍501-274, ❍504-278, ❍510-275). Students observed that identifying reliable data is part of the learning process of considering the validity of a source (e.g. an agency website such as the US Environmental Protection Agency versus a blog site) (❍502-287, ❍503-288, ❍506-161). Under the current district-wide policies, ECHS students feel that they

are lacking the freedom to advance their research skills and understanding of effective research methods. Students also cited district online policy barriers restricting use of "convenient" and accessible web-based communication platforms as a barrier to working with team members during and after school (e.g. "Facebook" versus the district's system, "Sakai") (❍501-180, ❍502-178, ❍503-189).

Among the constraints noted, the second area of concern related to parents' understanding the way T-PBL frames student transition from high school to college. Giving students greater independence in structuring and pacing their work, and allowing them to discover the skills of independent learning was described as a shift that parents must make if students are to succeed in their growth and maturity (❍502-432; ❍503-455, 462; ❍504-456). Additionally, parents have to learn to understand T-PBL and differences in the way students conduct their homework. Students' use of technology has the appearance of socializing, and therefore parents need to learn to adjust their views of technology as a tool for collaborative work with student teammates to conduct their work after school. This involves talking with each other on their cell phones and using their laptops for completing assignments (❖201-86, ❖202-85, ❍504-459).

The nature of these particular issues raised by students and parents suggests that the ECHS model for T-PBL has the ability to identify constraints and the potential for resolving major challenges faced in STEM education today. While these barriers and challenges are not easily addressed, they nonetheless frame key elements that will shift as more public schools choose STEM and T-PBL as the means to achieving a 21st century approach to learning for students who will be entering a globally defined work and career environment.

Table 5: ECHS Recommended Actions

Category	Recommendation	S	PA	T	PT
1. Transition from Traditional High School to the ECHS Program	Students should be aware of and plan to complete essential prerequisites before enrolling in the ECHS	•	•		
	Prospective students need to make an informed decision about the STEM focus of the program before enrolling	•	•	•	
	Course content needs to be scaffolded during the fall to provide specific remediation for students to prepare for project topics			•	
	Expose students to T-PBL prior to entering ECHS so that students can make the shift from traditional education learning model [middle school and/or high school]		•		•
	New student orientation should be structured to better describe the differences between traditional high school coursework and ECHS coursework	•			
	New student orientation could include a workshop prior to the official start of the school year to help students get to know one another and experience collaborative teamwork essential for understanding group dynamics	•	•	•	
	Conduct a more detailed orientation for parents of new students that provides more information about T-PBL, collaboration, as well as the different skill sets and overall learning objectives for ECHS students	•	•		
	Students recognize the value of hands-on work and want to expand opportunities to support learning objectives	•			
	Students recognize the value of hands-on work utilizing the building design and function as a learning tool	•			
2. Communication	Communication between teachers and parents should be more systematic during the year so that parents are better informed directly by teachers about progress and plans for projects and coursework	•	•	•	
	Create a student/staff directory with after school contact information	•			
	Foster early and ongoing communication between ECHS and HVCC faculty to enhance course alignment discussion throughout the school year				•
	Communication about the ECHS program needs to continue to build interest and support at the local, regional and state level as the program grows				•
	Communication with partnering school districts should focus on local student profiles in order to engage each of the new school districts and their local communities directly in the success of the program		•		•

S=Student; PA=Parent; T=Teacher; PT=Partner

Table 5: ECHS Recommended Actions

Category	Recommendation	S	PA	T	PT
3. Program Structure	Improve communication from administration to teachers and students throughout the school year regarding day-to-day activities	•			
	Providing opportunities for STEM professionals to engage with students on specific projects would be beneficial for students to increase their understanding of applied science, math and engineering	•		•	
	Coordinate STEM professional speakers to better align with project topics	•			
	Students want time to collaborate during the school day apart from classroom work, similar to a study hall period; more time is needed to work on projects	•			
	Teachers should establish clear rules and consequences for classroom conduct and group work	•			
	Schedule short breaks during class periods; establish time for lunch during the school day	•			
	Shorter lab periods could be more effective for younger students				•
	Scheduling between high school ECHS courses and HVCC courses could be better balanced (e.g., courses offered by ECHS and HVCC could be offered every other day)	•			
	Assess regional business workforce needs as the ECHS program grows to better align the number of enrollees/graduates completing the ECHS program and HVCC STEM coursework				•
4. Student/ Teacher Support	Provide more guidance on the process of identifying and applying for internships	•			
	Redesign CS laptops and other technology to improve student resources for collaboration and project work during and after school	•		•	
	Provide more training on CS tablets for teachers and students	•		•	
	Offer more than two courses; add a public speaking class	•			•
	Students need to have options in selecting their course of study; this could help to give them a needed sense of empowerment	•		•	

S=Student; PA=Parent; T=Teacher; PT=Partner

APPENDICES

APPENDIX A:

Focus Group Questions by Stakeholder Group

PAST FOUNDATION
Knowledge Capture Program
Focus Group Discussion - Students
May 9, 2012

Clean Technologies and Sustainable Industries
Early College High School (ECHS)

1. What were your main reasons for choosing to enroll in ECHS?
    a. What was your expectation?
    b. What do you think of it now?
    c. What do you like most about ECHS?
    d. What do you like least?
2. What are the overall differences in your experience between ECHS and your home high school?
3. What are your overall learning objectives for ECHS?
4. What do you think about the technology you are using at ECHS?
    a. What do you like most?
    b. What do you like least?
    c. Has technology changed the way you achieve your learning goals?
5. What are the important skills you need in order to be prepared for college and career?
    a. What are some of the ways you can explore career pathways?
        i. What is the role of teachers?
        ii. What is the role of your parents?
        iii. What is the role of mentors and others in your community?
    b. Can community college provide opportunities for career development?
    c. What do you think of the interaction you have had with STEM professionals?
6. What are your expectations for your senior year at ECHS?
7. What advice would you give to the incoming students in the fall of 2012?

PAST FOUNDATION
Knowledge Capture Program
Focus Group Discussion – Teachers and Parents
May 9, 2012

Clean Technologies and Sustainable Industries
Early College High School (ECHS)

1. What were your main reasons for choosing the ECHS?
    a. What was your expectation?
    b. What do you think of it now?
    c. What do you like most about ECHS?
    d. What do you like least?
2. What are the overall differences in your experience between ECHS and the traditional high school?
3. What do you think are the overall learning objectives for ECHS?
4. What do you think about the technology that teachers and students are using at ECHS?
    a. What do you think are the biggest challenges to use of learning technologies?
    b. Do you think there are disadvantages to the use of learning technologies?
    c. Has technology changed the way students achieve their learning goals?
    d. For Teachers: Has technology changed the way you teach?
5. What are the important skills students need in order to be prepared for college and career?
    a. What are some of the ways they can explore career pathways?
        i. What is the role of teachers?
        ii. What is the role of parents?
        iii. What is the role of mentors and others in your community?
    b. Can community college provide opportunities for career development?
    c. What do you think of the interaction students have had with STEM professionals?
6. What are your expectations for the 2012-13 academic year at ECHS?
7. What advice would you give to the students/parents of incoming students in the fall of 2012?
8. What is your view of the value of public/private partnerships to support 21st century education?
    a. What is the role of community partners and industry?
    b. What are the essential aspects of public/private partnerships?
    c. What is your view of ECHS as a model for public/private partnerships?

PAST FOUNDATION
Knowledge Capture Program
Focus Group Discussion – Community Partners
May 9, 2012

Clean Technologies and Sustainable Industries
Early College High School (ECHS)

1. What were your main reasons for getting involved with the ECHS?
    a. What was your expectation?
    b. What do you think of it now?
    c. What do you think is the best aspect of ECHS?
    d. Do you think there are aspects that can be changed to strengthen or improve the program?
2. What types of interactions have you had with other partners involved in ECHS?
    a. When did you first become involved?
3. What do you think are the overall learning objectives for ECHS students?
4. What do you think about the technology that the teachers and students are using at ECHS?
    a. What do you think are the biggest challenges to use of learning technologies?
    b. Do you think there are disadvantages to use of learning technologies?
5. What are the important skills students need in order to be prepared for college and career?
    a. What are some of the ways ECHS can support/guide student exploration of career pathways and preparation for college?
        i. What is the role of teachers?
        ii. What is the role of parents?
        iii. What is the role of mentors and others in your community?
    b. Can community college provide opportunities for career development?
    c. What do you think of the interaction students have had with STEM professionals?
6. What are your expectations for the 2012-13 academic year at ECHS?
7. What is your view of the value of public/private partnerships to support 21st century education?
    a. What is the role of community partners and industry?
    b. What are the essential aspects of public/private partnerships?
    c. What is your view of ECHS as a model for public/private partnerships?

Appendix B:

Survey Questions by Stakeholder Group

Early College High School Survey: Students

A. Background Information

1. Are you male or female?
2. What was your expectation of the ECHS Program before the school year began?
3. What do you think of the Program now?
4. What was your main reason for choosing to attend the ECHS Program?
5. What kind of orientation for the ECHS Program did you receive prior to the beginning of the 2011-2012 school year?
6. What do you like most about ECHS?
7. What do you like least about ECHS?
8. How would you compare your interactions with the other ECHS students and teachers to those in your home high school?
9. How would you compare college course instruction with high school course instruction at ECHS? Are there advantages to either that contribute to learning and meeting course goals?
10. How would you describe your overall ECHS learning objectives?

B. Technology

11. What do you think about the technology you are using at ECHS?
12. What are the biggest challenges you have encountered in using new learning technologies?
13. Do you think there are disadvantages in the use of technology in your ECHS coursework? If so, what are they?
14. Do you think that the use of new technologies has changed the way you go about achieving your learning goals? If so, what are those changes?

C. College Readiness and Career Pathways

15. What do you think are the important skills you should develop in order to be prepared for college and career?
16. What are some of the ways in which you can explore pathways to careers that you may want to pursue in the future?
17. Do you think community college offers opportunities for career development and/or to prepare for continuing your education in a 4-year college? If so, what are those opportunities?
18. What types of interactions have you had with STEM career professionals, and what have you gained from those interactions?

D. Expectations for Next Year

19. What are your expectations for your senior year at the ECHS Program?
20. What advice would you give to students entering the program in the 2012-13 academic year?

Early College High School Survey: Parents

A. Background Information

1. Is your student male or female?
2. What was your expectation of the ECHS Program before the school year began?
3. What do you think of the Program now?
4. What was your main reason for having your student attend the ECHS Program?
5. What kind of orientation to the ECHS Program did you receive prior to the beginning of the school year?
6. What do you think is the best aspect of ECHS?
7. Do you think there are aspects of ECHS that could be changed to strengthen or improve the Program? If so, what are those aspects?
8. Are there opportunities to interact with teachers and/or with other ECHS parents? If so, what are those opportunities?
9. How would you describe overall ECHS student learning objectives?

B. Technology

10. What do you think about the technology teachers and students are using at ECHS?
11. What do you think are the biggest challenges in adopting technology to support ECHS coursework and learning?
12. Do you think there are disadvantages in the use of the technology by teachers and students at ECHS? If so, what are they?
13. Do you see any differences in the way your student approaches studying and preparing for class through the use of technology? If so, what has changed?

C. College Readiness and Career Pathways

14. What do you think are the important skills that students should develop in order to be prepared for college and career?
15. How does the ECHS Program offer students the opportunity to explore career interests and pathways to career preparation?
16. Do you think community college offers opportunities for career development and/or to prepare for continuing education in a 4-year college? If so, what types of opportunities?
17. What is your view of the value of teachers and students interacting with STEM career professionals?

D. Expectations for Next Year

18. What are your expectations for your student's senior year of the ECHS Program?
19. What advice would you give to parents of students entering the program in the 2012-13 academic year?

E. Public/Private Partnerships

20. What is your view on the role of community and regional industry in developing a 21st century work-force?
21. What do you think is the value of public/private partnerships to develop 21st century educational programs?
22. What are the essential aspects of effective public/private partnerships to support 21st century education?
23. What is your view of the ECHS as a model for public/private partnerships for developing a new approach to 21st century education?

Early College High School Survey: Teachers

A. Background Information

1. How long have you been an educator?
2. What was your expectation of the ECHS Program before the school year began?
3. What do you think of the Program now?
4. What was your main reason for choosing to teach at the ECHS Program?
5. What kind of training for the ECHS Program did you receive prior to the beginning of the school year?
6. What do you like most about ECHS?
7. What do you like least about ECHS?
8. How would you describe the difference(s) in the interaction you have with ECHS students and with other teachers and staff in comparison to your experience in a traditional high school?
9. How would you describe overall ECHS student learning objectives?

B. Technology

10. What do you think about the technology you are using at ECHS?
11. What are the biggest challenges you have encountered in using new learning technologies?
12. Do you think there are disadvantages in the use of technology in your ECHS coursework? If so, what are they?
13. Do you think that the use of new technologies has changed the way you teach and in the way students achieve their learning goals? If so, what has changed?

C. College Readiness and Career Pathways

14. What do you think are the important skills students should develop in order to be prepared for college and career?
15. How does the ECHS Program offer students the opportunity to explore career interests and pathways to career preparation?
16. Do you think community college offers opportunities for career development and/or to prepare for continuing education in a 4-year college? If so, what types of opportunities?
17. What do you think about the opportunities and quality of student interaction with STEM career professionals?

D. Expectations for Next Year

18. What are your expectations for the second year of the ECHS Program?
19. What advice would you give to students entering the program in the 2012-13 academic year?

E. Public/Private Partnerships

20. What is your view on the role of community and regional industry in developing a 21st century workforce?
21. What do you think is the value of public/private partnerships to develop 21st century educational programs?
22. What are the essential aspects of effective public/private partnerships to support 21st century education?
23. What is your view of the ECHS as a model for public/private partnerships for developing a new approach to 21st century education?

Early College High School Survey: Partners

A. Background Information

1. How long have you been involved with the ECHS Program?
2. What was your expectation of the ECHS Program prior to the first year of the program?
3. What do you think of the Program now?
4. What was your main reason for becoming involved with developing and/or supporting the ECHS Program?
5. What do you think is the best aspect of ECHS?
6. Do you think there are aspects of ECHS that could be changed to strengthen or improve the Program? If so, what are they?
7. What types of interaction do you have with other partners involved in the ECHS Program, and what is the value of that interaction?
8. How would you describe overall ECHS student learning objectives?

B. Technology

9. What do you think about the technology teachers and students are using at ECHS?
10. What do you think are the biggest challenges in adopting technology to support ECHS coursework and learning?
11. Do you think there are disadvantages in the use of technology by teachers and students at ECHS? If so, what are they?

C. College Readiness and Career Pathways

12. What do you think are the important skills that students should develop in order to be prepared for college and career?
13. How does the ECHS Program offer students the opportunity to explore career interests and pathways to career preparation?
14. Do you think community college offers opportunities for career development and/or to prepare for continuing education in a 4-year college? If so, what types of opportunities?
15. What is your view of the value of teachers and students interacting with STEM career professionals?

D. Expectations for Next Year

16. What are your expectations for the second year of the program?

E. Public/Private Partnerships

17. What is your view on the role of community and regional industry in developing a 21st century workforce?
18. What do you think is the value of public/private partnerships to develop 21st century educational programs?
19. What are the essential aspects of effective public/private partnerships to support 21st century education?
20. What is your view of the ECHS as a model for public/private partnerships for developing a new approach to 21st century education?