

# **Talbot County Public Schools: One-to-One Laptop Initiative**

**Year 3: 2007-2008 Evaluation**

Submitted by:  
The Johns Hopkins University  
Center for Technology in Education

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## EXECUTIVE SUMMARY

Talbot County Public Schools (TCPS) has completed the third year of an innovative project, the One-to-One Laptop Initiative. Since September, 2005, each student in the incoming freshman class has received a laptop computer for use in the classroom. Concurrently, teachers received in-depth professional development and ongoing support regarding the integration of instructional technology into the curriculum.

An independent evaluation of Year 3 of the Laptop Initiative was undertaken by the Johns Hopkins University Center for Technology in Education (JHU CTE). Based on the goals of the initiative, the evaluation measured the effect of using technology for instruction in the classroom during the 2007-2008 school year. Using a mixed-methods approach, formative and summative evaluation techniques were used to examine the impact of the Laptop Initiative on students and teachers.

At the conclusion of the 2007-08 school year, with three of the four classes in the county's two high schools having participated in the ubiquitous use of computers in the classroom, it is clear that the learning environment has been transformed and that a new kind of learning community is evolving.

### Goal 1: Increase Student Achievement

Similar to the evaluation results for Year 2, *significant increases in achievement were made by students who used laptops in the classroom* compared to students whose teachers used more conventional classroom instruction. Comparative analyses, between students who had participated in the Laptop Initiative and students who had not utilized laptops, used student scores on the statewide High School Assessment (HSA) tests and end-of-course grades in core subject areas. This analysis showed that students using laptops in the classroom made clear gains.

Qualitative data, gathered by individual interviews, suggested that young people seem to learn differently and that the use of laptops in the classroom leveraged this kind of learning. It was reported that students, who used laptops in the classrooms, demonstrated an increased use of higher level thinking and a keen ability to effectively demonstrate their learning using technology.

### Goal 2: Provide Effective Use of Technology for Instruction

Interview respondents acknowledged the pivotal role played by the teachers in the Laptop Initiative. Teachers have moved from the position of simply adding technology to existing lessons to one of striving to use the best technologies to teach more effectively. This movement has propelled teachers toward a radical change in the manner in which they deliver instruction and manage their lesson planning. The laptops have become a critical tool for teachers and as a result there is a strong sense of teacher ownership of the Laptop Initiative.

### Goal 3: Increase Student Engagement

The relationship between engagement and student performance has been substantiated by extensive research in the field of achievement motivation. Students who are engaged and interested in school are more likely to learn. Participants in the interviews felt that students were likely to be working in a meaningful way when using technology as compared with more traditional instruction. It was felt that the multi-faceted learning experiences afforded by technology integration fostered critical, higher level thinking. In addition, the use of technology-based instruction to introduce and to illustrate complex concepts was seen by interviewees as a key driver in accelerating the learning process.

### Goal 4: Improve Educational Access for and Participation by High-Risk Students

Through structured interviews, it was acknowledged that perhaps one of the greatest benefits delivered by the Laptop Initiative has been to students with traditional learning disabilities, as instructional technologies and the associated diagnostic tools have facilitated the differentiation of instruction. According to strong testimonials from interviewees, capabilities of software programs to provide accommodations for students with disabilities offer a critical advantage over traditional instruction.

Participants interviewed intimated that current instructional technologies may not, as yet, adequately address other high risk student populations. It was suggested, on a more general level, that this may be an application of technology that has not yet been fully realized. In other words, the tools to help teachers individualize and customize to actually reach each student may still be under development.

Evaluation data over the past three years clearly indicate that the One-to-One Laptop Initiative has positively impacted the academic performance of students and the use of instructional technologies by teachers. TCPS is creating a new culture—a learning community geared to the 21<sup>st</sup> century. This school district is fostering an efficient, value-added learning environment that promotes self-directed learning for students. The long term outcomes of the Laptop Initiative are projected to result in more productive workers and informed citizens who are better prepared to access, evaluate, and appropriately use increasing amounts of information through the use of technology.

## **BACKGROUND INFORMATION**

Today's students are "digital natives" ...living and learning differently than students did even a few years ago! "They live with and respond to the rapidly transmitted sights and sounds of the digital world from television, computers, video games, and the Internet to cell phones, PDAs, email, and instant messaging. (Kevin W. Moran, 2007 Chairman of the Talbot County Chamber of Commerce Board of Directors)

Given the characteristics of today's students and the nature of the world that they will enter as adults, the effectiveness of traditional instructional methods comes into question. As high school drop-out rate continues to increase and performance on statewide standardized tests continues to be a challenge across the country, it is apparent that traditional approaches to education need to be augmented.

Beginning in 2005, in a bold and innovative move to align classroom instruction with the demands of the digital age, Talbot County Public Schools (TCPS) provided a laptop computer to each incoming ninth grade student. During the 2007-08 school year, all students in 9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup> grade (as well as their teachers) were participating in the One-to-One Laptop Initiative.

The intent of this Initiative was to utilize technology to transform the learning environment and to enhance student engagement in the learning process thereby producing gains in student achievement. In addition to enhancing school performance, the program was envisioned as a means to facilitate students' ability to function and to compete in the 21<sup>st</sup> century with its high demands for information, communication, and technology.

## **EVALUATION PERSPECTIVE**

An independent, external evaluation of the Laptop Initiative was conducted at the end of each of the past three school years by the Johns Hopkins University Center for Technology in Education (JHU CTE). End of year evaluations for the first two years of the Laptop Initiative have shown marked growth in student performance and teacher competencies. The Year 2 evaluation (November 2007) yielded findings of significant growth in teachers' effective integration of technology within the curriculum as well as a measurable increase in student achievement.

Prior evaluations of this project (Year 1: 2005-06 and Year 2: 2006-07) utilized formative and summative evaluation techniques (with a mixed-methods approach) to examine the impact of the Laptop Initiative on students and teachers. The evaluations served to

guide the early direction as well as measure the progress of the Laptop Initiative. As such, these evaluations included:

- student performance (as measured by Maryland state standardized tests and criterion based county tests),
- students', teachers', and parents' attitudes toward the Laptop Initiative (as measured by focus groups, surveys, and interviews), and
- structured classroom observations.

Building on the substantive mid- and end-of-year evaluations conducted in the first two years of the Laptop Initiative, the Year 3 evaluation included summative results of student performance on standardized achievement tests and criterion based academic performance as well as individual interviews with selected district administrators and school staff.

## METHOD

As in the previous two school years, the Laptop Initiative was conducted in both of the two high schools in Talbot County during Year 3. Laptop computers were issued to each incoming ninth grade student beginning in the fall of 2005. Students and teachers in three of the four grades (9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup> grades) used laptop computers and instructional software applications in the classroom during the 2007/08 school year. This report reflects the results of the evaluation of the third year of the implementation of the Laptop Initiative.

### *Participants*

A total of 1207 students participated in the Laptop Initiative during 2007-08. The total student study sample comprised:

- 9<sup>th</sup> graders (year of graduation = 2011)
- 10<sup>th</sup> graders (year of graduation =2010)
- 11<sup>th</sup> graders (year of graduation =2009)

As indicated in Table 1, the three graduating classes used the laptops in the classroom for varying amounts of time. The distribution of the student sample is shown below.

Table 1. *Distribution of High School Students Relative to the Laptop Initiative (2007-08)*

| YOG* | Grade Level | Years Laptop Use | N Students** |
|------|-------------|------------------|--------------|
| 2008 | 12          | 0                | 387 (24%)    |
| 2009 | 11          | 3                | 393 (25%)    |
| 2010 | 10          | 2                | 411 (26%)    |
| 2011 | 9           | 1                | 403 (25%)    |

\*Year of Graduation

\*\* Sample sizes include all students enrolled for any time during the 07-08 school year, even if students were not enrolled for the entire school year.

For the majority of the 11<sup>th</sup> graders (year of graduation = 2009), 2007-08 was the third school year during which they experienced the integration of laptops in the instructional and learning processes. For 10<sup>th</sup> graders (year of graduation = 2010), this was the second school year during which they used laptops. Upon entering high school in the fall of 2007, ninth graders (year of graduation = 2011) were each provided a laptop computer, making this school year their first experience with the Laptop Initiative. Students in the 11<sup>th</sup> grade (year of graduation = 2009) had used iBook laptop computers since the start of the Laptop Initiative, whereas students in the other two grades used MacBook laptop computers.

Because the 12<sup>th</sup> graders (year of graduation = 2008) did not participate in the Laptop Initiative, this group served as a control group in the total analysis of student achievement and performance. The 12<sup>th</sup> grade students were taught using traditional methods of instruction without the ubiquitous integration of computers into the curriculum.

Demographic characteristics of students are presented in Table 2. No significant differences were found between student groups with respect to the proportion of students with Individual Education Plans (IEPs) or 504 Plans, Limited English Proficiency (LEP) students, or eligibility for Free and Reduced Meals (FARM).

Table 2. *Demographic Characteristics\* of Students\*\* by Year of Graduation (YOG)*

|                  |        | 2008         | 2009         | 2010         | 2011         | Total        |
|------------------|--------|--------------|--------------|--------------|--------------|--------------|
|                  |        | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> |
|                  |        | 387 (24)     | 393 (25)     | 411 (26)     | 403 (25)     | 1594 (100)   |
| <b>Sex</b>       | Male   | 218 (56)     | 197 (50)     | 229 (56)     | 192 (48)     | 836 (52)     |
|                  | Female | 169 (44)     | 196 (50)     | 182 (44)     | 211 (52)     | 758 (48)     |
| <b>IEP*</b>      | No     | 354 (92)     | 358 (91)     | 389 (95)     | 370 (92)     | 1471 (92)    |
|                  | Yes    | 33 (8)       | 35 (9)       | 22 (5)       | 33 (8)       | 123 (8)      |
| <b>LEP*</b>      | No     | 381 (98)     | 383 (98)     | 406 (99)     | 397 (98)     | 1567 (98)    |
|                  | Yes    | 6 (2)        | 10 (2)       | 5 (1)        | 6 (2)        | 27 (2)       |
| <b>504 Plan*</b> | No     | 371 (96)     | 381 (97)     | 396 (96)     | 393 (98)     | 1541 (97)    |
|                  | Yes    | 16 (4)       | 12 (3)       | 15 (4)       | 10 (2)       | 53 (3)       |
| <b>FaRMs*</b>    | No     | 301 (78)     | 305 (78)     | 330 (80)     | 295 (73)     | 1231 (77)    |
|                  | Yes    | 86 (22)      | 88 (22)      | 81 (20)      | 108 (27)     | 363 (23)     |

\*Note: IEP = Students identified with a disability having an Individual Education Plan

LEP = Students with Limited English Proficiency

504 Plan = Students with a 504 plan

FaRMs = Students eligible for Free and Reduced Meals.

\*\* Sample sizes include all students enrolled for any time during the 07-08 school year, even if students were not enrolled for the entire school year.

## ***Data Collection***

Quantitative data collected for this report included:

- student performance, based on final course grades in core subject areas
- student scores on the Maryland State High School Achievement (HSA), a set of four standardized tests

Beginning in 2009, passage of the HSA tests will be mandated for all Maryland high school seniors as a prerequisite to earning a high school diploma. The four tests, comprising the HSA, measure achievement in algebra, biology, English, and social studies.

Data were gathered in conjunction with the Information Technology Department at TCPS. Quantitative data analyses were conducted to examine student performance of students who had participated in the Laptop Initiative (i.e., students in graduation years of 2009, 2010, and 2011). Further data analyses included comparison of school achievement and standardized test performance of students in the graduation years of 2009, 2010, 2011 with the graduating class of 2008. Since the students, from the graduation year of 2008, had not participated in the laptop program; aggregate data from this graduating year served as a control group in the analysis of data from the three successive years.

Qualitative data were gathered through five individual interviews. The interviews were conducted with personnel from TCPS who were instrumental in the implementation and ongoing development of the program. The interviewees included: the Principals from both high schools, the Assistant Superintendent of Instruction, the Staff Development Specialist, and the Instructional Facilitator for Technology. The first two mentioned positions were district administrators; whereas the specialist was an administrative support position and the facilitator was a teacher position.

A set of structured questions that reflected the objectives of the Laptop Initiative comprised the qualitative data collection instrument. In addition to asking interviewees to comment on the four goals of the Laptop Initiative, the interviewer also requested input from participants regarding long term outcomes and remaining challenges of the program. (Interview questions can be found in the Appendix).

## YEAR THREE RESULTS

Findings from the end-of-year evaluation for Year 3 are reported as they relate to the four goals of the Laptop Initiative, which were as follows:

1. Increase student achievement.
2. Provide effective use of technology for instruction.
3. Increase student engagement.
4. Improve educational access for and participation by high-risk student groups.

The student achievement goal was evaluated primarily with quantitative achievement data with some qualitative data drawn from individual interviews. The remaining three goals were evaluated using only qualitative data collection methods.

### Goal 1: Increase student achievement

#### Quantitative findings: standardized state tests

By the end of the 2007-08 school year, all four classes (ninth through twelfth grades) had taken the algebra HSA test. The students in the graduation years of 2008, 2009 and 2010 had also been eligible to take the biology and English HSA tests. Because 9<sup>th</sup> graders are not administered the biology and English HSA tests, comparative analyses for these subject areas do not include this group of students. For this reason, HSA scores for biology and English are not displayed for students in the graduation class of 2011.

All analyses included students with disabilities and students with limited English proficiency. The analyses included all students who had posted an HSA score, including students who had retaken an exam after failing the first attempt. There was no indication in the available, aggregate data of the number of times a test had been taken by individual students, so this factor could not be analyzed. Average scores for students are presented in Table 3, which also displays the significance levels of the comparisons among the classes.

Table 3. *Average HSA Scores for Students by Year of Graduation (YOG).*

| HSA               | 2008          | 2009           | 2010           | 2011          |
|-------------------|---------------|----------------|----------------|---------------|
|                   | <i>M (SD)</i> | <i>M (SD)</i>  | <i>M (SD)</i>  | <i>M (SD)</i> |
| <b>Algebra*</b>   | 412.07 (41.2) | 428.7 (30.9)   | 437.40 (26.7)  | 442.59 (22.7) |
| <b>Biology**</b>  | 411.10 (38.5) | 420.03 (31.08) | 423.16 (26.61) | N/A           |
| <b>English***</b> | 405.42 (37.1) | 415.43 (35.2)  | 412.28 (29.3)  | N/A           |

\* $F(3, 1388) = 60.84, p < .001$

\*\*  $F(2, 1036) = 12.85, p < .001$

\*\*\*  $F(2, 1068) = 8.11, p < .001$

Statistical analyses were performed for test scores on each HSA test to determine differential performance by year of graduation. The results of the analyses are presented below:

- Students in the graduation years of 2010 and 2011 scored significantly higher in algebra than students in the graduation year of 2008, who had not used laptops in the classroom.
- Students in the graduation years of 2010 and 2011 scored significantly higher in algebra than students in the graduation year of 2009, which was the first class to have the laptops in the classroom.
- Students in the graduation years of 2009 and 2010 scored significantly higher in biology and English than students in the graduation year of 2008, who did not use laptops in the classroom.

In addition to the analyses of HSA average scores, the HSA pass rates for the four classes were analyzed and are shown below in Table 4.

Table 4. *Pass Rates for HSA Tests for Students by Year of Graduation (YOG).*

| HSA            | 2008         | 2009         | 2010         | 2011         |
|----------------|--------------|--------------|--------------|--------------|
|                | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> |
| <b>Algebra</b> | 218 (60.1%)  | 355 (94.7%)  | 346 (94.0%)  | 257 (90.8%)  |
| <b>Biology</b> | 239 (67.7%)  | 294 (85.0%)  | 275 (81.4%)  | N/A          |
| <b>English</b> | 232 (64.6%)  | 306 (86.0%)  | 255 (72.2%)  | N/A          |

Results of analyses from Table 4:

- More than 90% of students in the graduation years of 2009, 2010, and 2011 were identified as passing the algebra test; only 60.1% of students in the graduation year of 2008 had passed the algebra test. This represents more than a 50% increase in the overall pass rates of students who participated in the Laptop Initiative.
- More than 80% of students in the graduation years of 2009 and 2010 were identified as passing the biology test; only 67.7% of students in the graduation year of 2008 had passed the biology test. This represents more than a 20% increase in the overall pass rates of students who participated in the Laptop Initiative.
- 86% of students in the graduation year of 2009 and 72% of students in the graduation year of 2010 were identified as passing the English test; only 64.6% of students in the graduation year of 2008 had passed the English test. This represents at least a 12% increase in the overall pass rates of students who participated in the Laptop Initiative and took the English test.

In summary, average HSA scores in algebra, biology, and English were significantly higher for students who had experienced the Laptop Initiative (i.e., the graduation years of 2009, 2010, and 2011) compared to students who had not used laptops (i.e., the

graduation year of 2008). As a result a significantly greater number of students from the graduation years of 2009, 2010, and 2011 passing the three Maryland state HSAs.

Quantitative findings: End-of-course Grade for Core Subjects

To examine student school achievement in core subjects, the four classes were compared regarding their past performance in 9<sup>th</sup> grade courses. End-of-course grades for ninth grade core classes in English, math, science, and social studies by graduating class were analyzed. Average ninth grade course grades for each class are presented in Table 5.

Table 5. *Average Ninth grade Core Course Grades by Year of Graduation (YOG).*

| Core Courses            | 2008          | 2009          | 2010          | 2011          |
|-------------------------|---------------|---------------|---------------|---------------|
|                         | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> |
| <b>English*</b>         | 80.87 (13.1)  | 78.40 (15.4)  | 76.58 (13.8)  | 79.42 (13.7)  |
| <b>Math</b>             | 78.80 (14.3)  | 78.73 (13.9)  | 78.66 (12.7)  | 80.38 (12.5)  |
| <b>Social Studies**</b> | 81.36.(16.8)  | 76.15 (19.9)  | 81.80 (15.2)  | 83.93 (13.2)  |
| <b>Science***</b>       | 80.82 (13.1)  | 76.97 (16.3)  | 78.39 (13.9)  | 78.87 (15.7)  |

\* $F(3, 1439) = 5.87, p = .01$

\*\*  $F(3, 1454) = 14.55, p < .001$

\*\*\*  $F(3, 1397) = 4.25, p < .01$

Significant differences were found in end of year grades for all 9<sup>th</sup> grade courses except for math. Results of the analyses of grades in other core subject areas are examined below.

- English. Students in the graduation year of 2011 and 2008 attained significantly higher course grades in ninth grade English compared to students in the graduation year of 2010. There were no significant differences found between English course grades for students in the graduation years of 2008, 2009, and 2010.
- Social Studies. Students in the graduation years of 2008, 2010 and 2011 attained significantly higher course grades in ninth grade social studies compared to students in the graduation year of 2009. There was no significant difference found between the graduating years of 2008, 2010, and 2011.
- Science. Students in the graduation year of 2008 attained significantly higher course grades in ninth grade science compared to students in the graduation year of 2009. There was no significant difference in science found between the other graduating years.

In summary, average end of year grades for core courses varied across years of graduation with some indication of upward trends in mathematics and social studies. The data on course grades failed to uncover significant differences between students

involved in the Laptop Initiative as compared to students not participating in the Laptop Initiative. A possible explanation may be the impact of teacher turnover resulting in teachers new to the program who may still be developing expertise in using instructional technologies.

#### Qualitative findings: Interviews

Student achievement, relative to the Laptop Initiative, was discussed in individual interviews, during which all five participants independently suggested that student achievement is broader than what is indicated by standardized test scores. One respondent shared the view that young people now seem to learn differently and that the laptops leverage this learning capability more effectively than “paper and pencil or a slide rule”. The perception of the educational professionals interviewed was that improved school performance seemed to be associated with an increased sense of confidence by students in their computer skills. It was felt that, through the Laptop Initiative, students appeared to have acquired a keen ability to effectively demonstrate their learning using technology. According to one person’s observation, students seemed to have developed a sense of “system thinking” in that they showed increased ability to articulate their learning.

One principal, reflecting on anecdotal reports from parents, suggested that students were spending more time at home working on projects and were using online study guides to prepare for the advanced placement exams. Other interviewees noted that students were doing more depth research and using more sources of information in researching a topic. These activities are likely to drive toward performance excellence and increased academic achievement.

## **Goal 2: Provide Effective Use of Technology for Instruction**

In responding to the issue of student achievement, interview participants were quick to comment on the impact of the Laptop Initiative on teachers and their instructional proficiencies with respect to technology. One respondent stated that the laptop program “is having the greatest impact on teachers and how they deliver instruction.” It was noted, by those interviewed, that teachers had continued to demonstrate growth in the use of instructional software as a means to guide their lesson planning and to transform their instructional approach.

Both principal noted that teachers had progressed beyond their developing basic skills in using instructional technologies and are now finding new ways of bringing technology to the classroom. “Teachers have taken ownership of using the laptops effectively.” In the words of this principal, this was no longer an “initiative”, but it had become a “total infusion” of technology. “There’s been a change of direction: from ‘what do I do now that I have this computer?’ to ‘what do I do without the computer?’ (e.g., when the

network is down, equipment needs repair, or software upgrades were being done)". As stated by another participant, "We now have a critical mass of teachers who have changed the way they deliver instruction. For these teachers, there is no going back. They view this as a critical tool in their arsenal."

As teachers searched for appropriate instructional technologies, they reportedly used research data to evaluate the documented performance of other practices and approaches that used technology in the classroom. In other words, teachers were not blindly using an instructional technique just because it used technology; rather, they had become careful consumers of instructional technologies. "I think we have a collection of teachers who are really making strides in starting to move from simply adding technology to existing lessons... to thinking about how to effectively teach with technology." All participants noted that, during the third year of the Laptop Initiative, teachers were really "getting into" the laptops and using them in new applications; even for everyday tasks laptops were reducing paper work and inefficiencies in the classroom.

Increased teacher empowerment had been observed as well as a greater sense of teacher ownership of the Laptop Initiative, even though the project had been conceived as a top-down initiative. According to one administrator, the "work is happening in the classrooms... it's not happening in the central office... it's the teachers who are doing the work."

### **Goal 3: Increase Student Engagement**

It is often difficult to directly observe engagement, as this is technically a mental state of motivation, perseverance, interest, effort, and attitude. However, observations of behavior can often substantiate whether or not students are engaged. One of the principals interviewed recounted her observations and stated that, when using the laptops, students were more likely to be working in a "meaningful way" as compared to when they were involved with paper/pencil tasks. Students were "not just completing a task but being involved in it." Other respondents shared the perspective that the technology-infused learning afforded by computers fostered higher level thinking in students and the ability to apply recently acquired knowledge in new, creative ways. One respondent reported that students increasingly seemed to be using a scientific approach in acquiring knowledge and in forming conclusions.

A principal reported that students appeared to be extremely motivated to use the technology and were more engaged simply by being able to have access to a large and varied quantity of information. It was noted that, instructional software allowed teachers to better explain and to more effectively demonstrate complex concepts, such as the properties of linear relationships (in mathematics) or the principles of federalism

or due process (in social studies). Along this vein, a participant suggested that virtual chemistry labs afford opportunities for teachers to replicate experiments that might otherwise be dangerous to perform in a high school chemistry lab. Bringing complex and/or abstract concepts into clear focus is likely to increase student interest and motivation, thereby, accelerating the learning process.

One participant suggested that “we are at a point in time where everything that we *were* doing is becoming less effective.” This person also offered the opinion that achievement tests were not indicative of whether students were engaged or “on task”. In the opinion of another participant, who had been a classroom teacher during the first two years of the initiative, the biggest indicator of engagement was the participation of previously non-engaged students. Upon further clarification, the participant stated that underperforming students, who previously showed little interest in classroom activities, began to demonstrate a new sense of involvement and effort after the laptops were introduced.

One respondent reported that, when the funding for the Laptop Initiative appeared to be in jeopardy, students became very vocal in advocating for the continuation of the laptop program. It seemed clear that students realized that the potential loss of this tool would have negative consequences for them. This respondent felt that the intensity of student expression, regarding this issue, was suggestive of a high level of engagement.

#### **Goal 4: Improve Educational Access for and Participation by High-Risk Students**

The term, “high-risk students”, may present misconceptions as it encompasses a variety of classifications including:

- students eligible for free and reduced meals
- students with special needs and/or learning disabilities
- students with limited English proficiency

Several participants made statements regarding the fact that the Laptop Initiative was an “economic leveler”. Other participants expressed the opinion that this technology reduced barriers by making extensive information available to everyone. As was noted, in the past only students whose parents had the economic means to provide a computer would have had these experiences.

Some participants felt that it may be difficult to substantiate the benefits resulting from the Laptop Initiative for economically disadvantaged students due to the social/emotional factors that also impact student performance. The impact of the

laptops, per se, on this segment of the student population was felt to be less obvious and was clouded by other environmental factors.

According to those interviewed, the benefits of the laptop computers for students with learning disabilities were more pronounced. All participants agreed that the impact of the Laptop Initiative on classroom performance had been greatest for students with “traditional learning disabilities.” Respondents confirmed that instructional technologies and the associated diagnostic tools have streamlined the differentiation of instruction. Teachers now have access to diagnostic software tools to assess student skill levels and to determine the intervention needed to effectively teach students with learning disabilities. Additionally, instructional software can provide immediate feedback to students to further support remedial activities.

All participants agreed that computers in the classroom had a “tremendous effect” in the academic experiences of students with special learning needs. Kurzweil Educational Systems software, which scans print information and converts it to voice, afforded students the opportunity to learn content without being encumbered by reading problems. As an additional benefit of software programs, which provide accommodations for individual students, participants pointed out that the programs help to remove the stigma of a student’s using altered lesson delivery and content. Because the assignments are delivered electronically, this reduces (and nearly removes) the possibility that other students are aware of any accommodations in assignments.

The diagnostic and prescriptive pacing of some instructional software programs (such as Cognitive Tutor) targets the precise area(s) where individual students are experiencing difficulties in math. One respondent pointed out that software can re-direct students to problem areas and allow students to “take ownership of their learning as they become aware of the content areas they need to review.”

One participant focused on the capability of computers to improve students’ organizational skills. Organizational issues are significant inhibitors for students with learning disabilities. Computers allowed students to establish separate folders, so papers don’t get lost. “This is huge in terms of student success! Being able to organize a binder is big for all students,” and is even more significant for students with special needs.

Another participant felt that “We need to find the right tools to help teachers individualize and customize to really reach all students with challenges. We’re coming along rapidly and we’re on the right trajectory... but, we have to be patient to get there as there will be no instant results.”

## Other Findings

### Success Indicators

Both principals noted that the Laptop Initiative had become a kind of “magnet” in helping to recruit newly trained teachers, as the initiative sets TCPS apart and above many other school districts.

### Remaining Challenges

While the school district had encountered and overcome numerous challenges since the launch of this initiative in 2005, a question regarding remaining challenges was included in each interview. Responses tended to focus on the following broad themes:

- Funding support and commitment to ensure long-term program sustainability
- Addressing the varied needs of students “at risk” through technology
- Updating software tools and network infrastructure

It was recognized by all participants that funding continues to be a challenge and that unique needs continue to be present among the categories of “at risk” students.

Keeping the network fully operational within budget allocations was seen as a continuing challenge as technology changes and as updated equipment requires enhanced network access. “Work-around” processes have been needed as cost effective approaches, which has created some network inefficiency and unreliability. Unfortunately, it was noted that such network issues can negatively impact teachers’ use of technology and make it difficult for teachers to move forward in using technology in the classroom.

There were two comments regarding professional development with one respondent stating that “professional development must continue to be provided... we need human resources, funding, and time to adequately support teachers in the use of technology.” One participant noted that different levels of professional development and training were needed to address the different levels of teachers’ technological skills.

Participants noted that some teachers may require support in establishing a student-centered learning environment. Self-directed learning on the part of students requires a shared role between teachers and students. “We must become more comfortable with trusting the learner ... and trusting that kids want to learn. We need to share control of learning with the learner.”

Additional input by participants set forth the caution that a balance must be forged by teachers as they guide students to evaluate what is “out there” and help students make judgments based on the information found on the Internet. Fostering “digital literacy”

in students so they learn “to evaluate what they read on the Internet and to form a conclusion about what is biased and what is not”.

### Projected Long-Term Outcomes

The building of student competencies in using the technology that they’re going to need in the workplace was thought to be “monumental” by all participants. Similarly, respondents recognized that the Laptop Initiative is likely to produce tech savvy students who are unlikely to be intimidated by the technology of today and tomorrow. Additionally, respondents thought the Laptop Initiative developed skills that will contribute to student confidence, particularly as they compete for jobs as adults.

One administrator mentioned that an informed citizenry would be a future outcome of the Laptop Initiative and that the technology was teaching students to know how to access information and how to make informed decisions.

Another participant suggested that the long-term outcomes might not be measured by test scores and class grades. “We will be producing more productive workers with a competitive edge with less drain on society. They will be familiar with the technology no matter what they do. Secondly, we will be producing smarter, more effective workers.”

## **IN SUMMARY: Year 3**

Three years of evaluation data indicate that the One-to-One Laptop Initiative in Talbot County has had a positive impact on students' academic performance and on teachers' effective use of technology in the classroom. Growth in these two areas has resulted in significant gains in student achievement substantiated by the analyses of state standardized assessment tests. In addition, this evaluation shows firm evidence of enhanced student engagement and improved educational access for high-risk student groups.

### **Pivotal Findings**

- Significant improvement was found on state-mandated achievement tests (Maryland High School Assessment) by students involved in the Laptop Initiative, as compared to students who had not used laptops in the classroom.
- Analysis of end-of-year grades in freshmen English, math, social studies, and science attained by students involved in the Laptop Initiative and compared to students who had not used laptops in the classroom yielded inconclusive results.
- Students seemed to acquire an increased ability to articulate their learning through technology and to employ higher level thinking.
- Using technology to deliver and to enhance instruction, teachers continued to seek new instructional technologies to broaden and to vary their teaching approaches and techniques.
- Increased teacher empowerment and a heightened sense of teacher ownership of the Laptop Initiative were reported.
- Successful implementation of the Laptop Initiative was supported by teachers who were substantially changing the way they deliver instruction and information to students.
- Evidence and accounts of improved student engagement were reported, as instructional technology allowed students to be involved in their learning in more meaningful ways.
- Instructional software allowed enhanced presentation and introduction of complex concepts which was reported to increase student interest and motivation.
- Using technology in the classroom --- on each student's desk --- appeared to reduce barriers by making technology available to all students regardless of their economic resources.
- Students with traditional learning disabilities routinely used software capabilities that allowed lessons and assignments to be adapted to specific learning styles or to accommodate for learning deficits.
- While technologies had been shown to enhance the learning environment for students with learning disabilities, the effective use of technology to impact school performance for other at-risk student groups may still be evolving.

## **Recommendations**

Based on the results of the Year 3 evaluation, JHU CTE recommends the following actions:

- Continue providing high-quality professional development to focus teachers on rigor, relevance, relationships, and reflection through the use of technology to engage at-risk students in:
  - Creating a positive team-based 21<sup>st</sup> century learning environment
  - Delivering explicit instruction
  - Using 21<sup>st</sup> century technology tools
  - Using collaborative and co-teaching practices
- Develop a workgroup to develop a lesson plan bank for teachers of high-quality technology-rich lesson plans
- Provide support to teachers for online collaboration and resource exchange to further facilitate sharing of high-quality technology-rich lessons and instructional techniques
- Develop teachers' knowledge and skills in using a variety of behavior management techniques that optimize learning for all students, including subgroup populations
- Continue building expertise among the Vanguard Team for 1) infusing state-of-the-art and emerging technologies with effective instructional strategies and 2) providing coaching and support to less-skilled teachers

## **Conclusion**

Through the Laptop Initiative, TCPS is fostering a new learning community that is making a positive difference in the way teachers teach, in the way students learn, and in the post-secondary school experience of each of its students who will be better prepared to compete in the workforce.

TCPS has demonstrated strategic insight and taken tactical action in areas important to the success of the program, such as:

- Continued evaluation of technology-based instructional tools and software.
- Professional skill instruction through delivering a comprehensive, high quality professional development program that uses a team of technically savvy teachers for coaching and job-embedded training.
- Pending assignment for 2008-09 of on-site support teacher through an Instructional Facilitator for Technology.

For the third consecutive year TCPS admirably met the goals of the Laptop Initiative and continues to refine and move beyond the original vision of the program . In accomplishing this, TCPS continues to transform the learning environment and to create technology-based high schools that can respond to the challenges of the 21<sup>st</sup> century.

## APPENDIX

### 2008 TALBOT COUNTY PUBLIC SCHOOLS 1:1 LAPTOP INITIATIVE

#### *Administrator Interview Protocol*

##### **Goal 1: Increase Student Achievement**

- From your observations and interactions with students, teachers, and parents, how (or in what ways) do you think that the laptop initiative has affected student achievement? What specific indicators have you seen?

##### **Goal 2: Provide effective use of technology for instruction**

- From your observations and interactions with students, teachers, and parents, how (or in what ways) do you think that the laptop initiative has influenced the effective use of technology for instruction?

##### **Goal 3: Increase student engagement**

- From your observations and interactions with students, teachers, and parents, how (or in what ways) do you think that the laptop initiative has impacted student engagement, motivation, interest, and attention? What specific indicators have you seen?

##### **Goal 4: Improve educational access for and participation by high-risk student groups**

- In your opinion, in what ways will the initiative influence students of “at risk” populations or students with disabilities?

##### **General Questions:**

- What challenges (if any) remain with the laptop initiative? Solutions ?
- What have been the most significant outcomes that have resulted from the laptop initiative? What is the most noteworthy event during the last 12 months with respect to the Laptop Initiative?
- What are the long term outcomes that you think will result from the initiative? What outcomes are likely with respect to student preparation for higher education or the world of work?
- What notoriety, commendation, or recognition have TCPS teachers or students received as a result of the Laptop Initiative? (Have there been presentations at conferences? Articles in the newspaper? Student or teacher work posted or reviewed on the Web? What interest have you received regarding the Laptop Initiative from MSDE, other LSSs, agencies, local businesses?)