HUNTERDON CENTRAL REGIONAL HIGH SCHOOL
TABLET PC PROGRAM 2005-07
OVERVIEW AND EVALUATION

"These tools have enhanced my teaching, my organization, and most importantly, student learning in my classroom." –Tablet PC Cohort Teacher

"This has been the most fun and exciting [time] of my teaching career -- after 14 years, that's saying a lot." –Tablet PC Cohort Teacher

June 30, 2006

Can putting tablet PCs in the hands of qualified teachers significantly improve their practice? That's the question teachers at Hunterdon Central School District in Flemington, NJ set out to answer. Dissatisfied with the classroom technology model that had been in place for a number of years, a pilot cohort of 33 teachers developed and tested a new model focused on a tablet PC, supported by wireless projectors and wireless connectivity. Their findings? When supplemented with the right mix of professional development, planning and technical support, these tools have a remarkable impact on teaching and learning!

What follows is a description of the pilot and an overview of the research that has resulted in the expansion of the program to the full faculty, nearly 250 teachers, for summer of 2007. Also highlighted are the key factors that support and extend the program's success.

Key Findings

The teachers reported that the tablet PC pilot resulted in:

- Greater flexibility in classroom instruction
- More student engagement
- Increased productivity
- Better organization
- A feeling of empowerment

Critical Success Factors

Four key factors contributed to the pilot's success:

- A shared decision-making process that actively involved the teachers and placed their ideas about curriculum and instruction front and center.
- A dynamic professional development program, developed by teachers, for teachers, that included summer work and monthly focus groups.
- A structured program of real-time technical support that ensured very little "down-time" for teachers both in and out of the classroom.
- A systematic approach to planning that ensured all of the pilot's goals were met through application of proven project management techniques.

Evaluative Methodology

The Information Systems department and a doctoral candidate from Columbia University Teachers College performed the following qualitative and quantitative research:

- classroom observations
- interviews
- a review of participant journal entries
- surveys

HUNTERDON CENTRAL REGIONAL HIGH SCHOOL: PROFILE

Hunterdon Central is a 3,000-student regional high school located in central New Jersey about an hour west of New York City. The school's 72-acre campus-style environment houses four general classroom buildings, a music building, a 2,000-seat field house, a student-run FM radio station and cable television station.

The school has received numerous academic awards. It is the only New Jersey school to receive **Blue Ribbon School** status by the U. S. Department of Education two times, the highest national recognition a school can achieve. The school was also the first to be designated as a **Star High School** by the New Jersey Department of Education.

Hunterdon Central was an early adopter of networked classroom technology during the mid-1990s, pioneering the five-computer classroom model. Technology distinctions include:

Smithsonian Institution
The Five-Computer Classroom Model is featured in the Permanent Research Collection on Information Technology

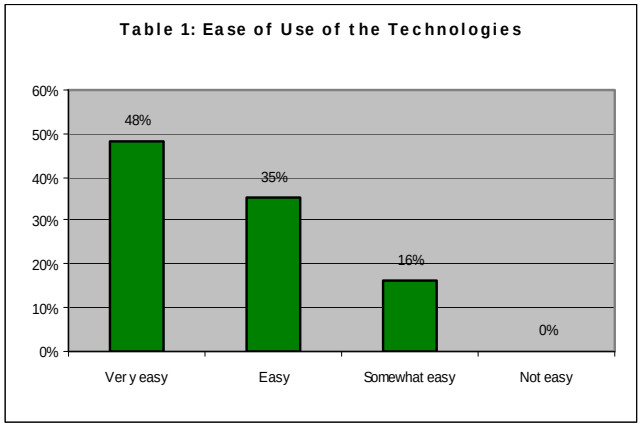
Business Week Magazine
Recognized as a High School of the Year for technology

National Education Commission
Recognized for effective use of technology to solve the problems of time constraints

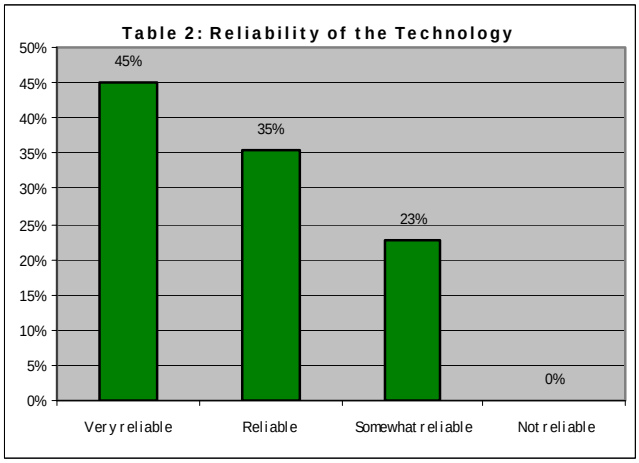
How Did It Start?: The origins of the program began in a series of professional development days held in the fall of 2004 when departments discussed ways teachers could use technology to meet their goals for curriculum and instruction. The District's Educational Technology Committee used these results to develop five possible technology pilots and asked teachers to write proposals for the programs that interested them. The tablet PC pilot was the most popular by far, representing more than half of the proposals. In March 2005, after one year of study and planning, the District approved a tablet PC pilot program.

The tablet cohort consisted of 33 volunteers selected from all departments – English, social studies, math, science, world language, health & physical education, fine arts, family & consumer science, communications, business, special education and design & technology. In June, teachers received a tablet PC, and in July and August they attended two days of professional development. Most of their classrooms received wireless projectors, and the district installed a wireless network. The pilot participants possessed varying levels of technological aptitude. Some of the teachers had worked extensively with technology, while others had not done much more than take attendance, use word processing software and search the internet.

Leading and Learning: From the time they received the tablets in June, almost all of the cohort teachers were open-minded about the uses of the technology. During the two summer training days, cohort members learned the inking functionality, tested various software programs and navigated a wireless classroom environment that included a wireless projector. The only expectation repeated to the group several times was that they use the tablet as the sole repository for all of their work.



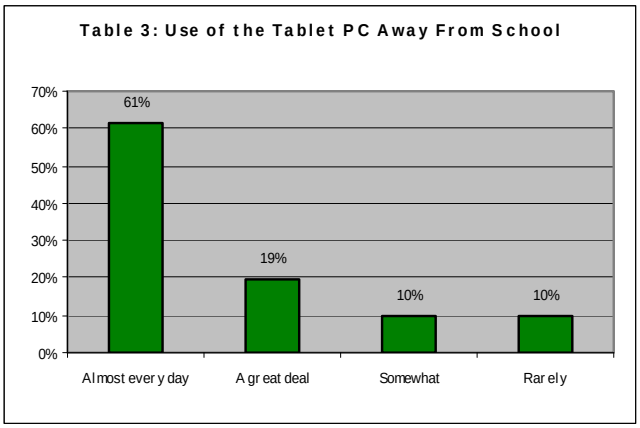
Enthusiasm for the pilot among the teachers took different forms. Some came to school for additional days that summer to practice using the tools in the classroom and began to build lessons revolving around the technologies. Others took a more cautious approach, but seemed excited about testing the technologies at the start of school. As indicated in Table 1, most teachers did not find the tablet technologies overwhelming. This feeling may also be attributed to the "convertible" tablet PC model, which can also be used as a traditional laptop computer.

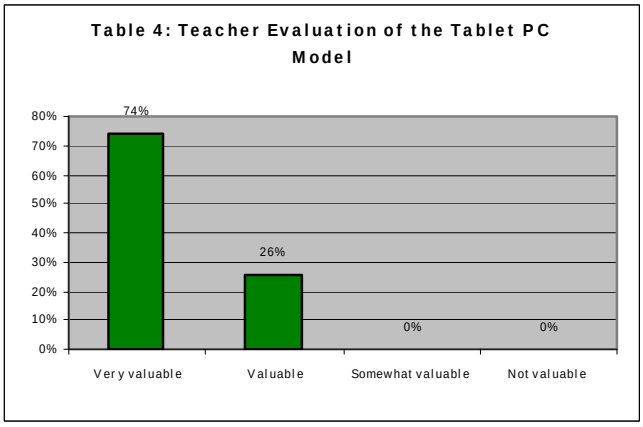


The Start of School: The first two weeks of school were vibrant and exciting. Early feedback indicated that the tablet PCs made an immediate impact in class, despite the fact that teachers and IT support staff were working through a few bugs in the systems. After solving early support issues, the teachers found the technology very reliable overall (see Table 2), and they quickly integrated the tablets into their routines in a variety of ways. Many teachers used the

combination of the tablet and the projector as a substitute for the blackboard in their rooms. By using blank PowerPoint slides, Windows Journal pages or OneNote sheets, teachers would illustrate concepts, solve problems and even hand the tablet to students so they could demonstrate concepts to the class. Some teachers then posted their daily annotated lessons to an online curricular management site so students who had learning difficulties or had missed school could review the day's activities. By the end of September there was a buzz among the tablet teachers about what a difference these tools made to their teaching. This excitement began to spread among the staff without tablets, and they began asking about any plans to expand this program in the near future.

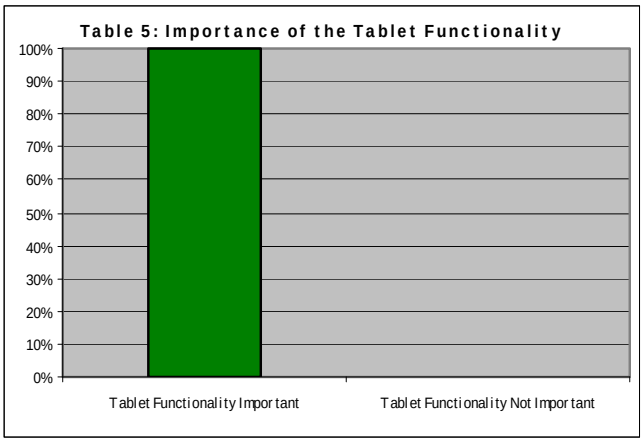
Hitting Stride: During the regular monthly cohort meetings in the fall, teachers relayed stories of transformation in their classrooms. They cited more engagement from their students, increased flexibility in the ways they delivered the curriculum and greater professional productivity in general. (For more on these themes, see the next section of this report.) In addition, teachers continued to report satisfaction with the reliability and ease of use. Most cohort teachers indicated that they used the tablets and a variety of other tools every day, and the tablets quickly became an integral part of their practice, using them not only in the classroom, but also in the cafeterias, in the hallways, in the teacher workrooms, in the gyms and on the athletic fields. Most also used the tablets off campus for curricular planning and other activities, as indicated in Table 3.





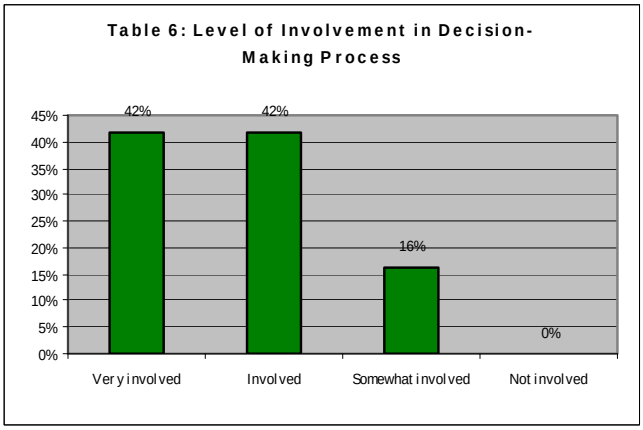
Reflection and Evaluation: By November, there was a lot of energy and momentum behind the project. Teachers told us that the tools had become an indispensable part of their planning and teaching practice (Table 4). Many remarked that they could not imagine teaching "the old way," and they enthusiastically recommended expanding the scope of the pilot to include other teachers next year. When surveyed, most teachers also said they would be willing to mentor new tablet teachers next year and to participate in teaching a new cohort of teachers how to use the technologies from the standpoint of hardware, software, instructional use and curricular planning.

Teachers stated clearly that they had come to rely upon the tablet functionality, in addition to the standard laptop functionality. This was evident especially in their use of the tablets with wireless projectors as a substitute for the blackboard. When asked if using the tablet functionality in and out of class was important to them, 100% of the teachers said that they needed that functionality



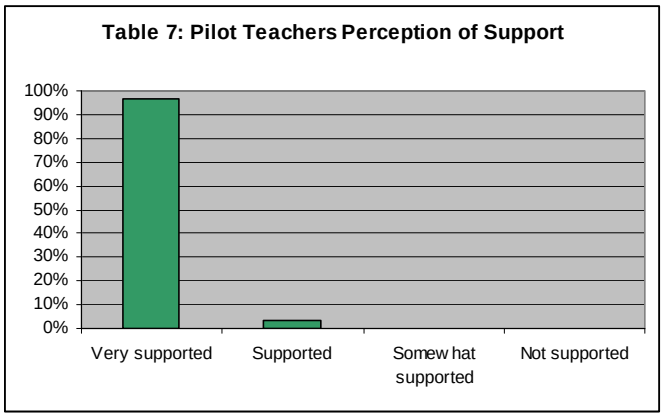
to be present. (Table 5). In surveys and informal conversation, most teachers said that they would not have thought inking would be so important before they had an opportunity to test it in the classroom and see how powerful a tool it was for student learning. The inking, used in conjunction with the wireless projectors, provided a tool for focusing student attention, helping diverse learning styles, illustrating complex concepts, instantly responding to students' questions and capturing a record of each class.

Critical Success Factors: When examining factors unique to Hunterdon Central, several factors beyond the choice of technologies undoubtedly contributed to the success of the pilot. First of these is the *high degree of shared decision-making* inherent in the process. Central is a Malcolm Baldrige Quality School that encourages a bottom-up management approach. Throughout the development, launch and support of the pilot, teacher reflection and feedback drove the direction of and adjustments to the program. Teachers understood this (Table 6), and they took this responsibility very seriously. This shared approach helped the committee planning the pilot to determine which technologies teachers might find most useful. It aided the Information Systems department with the implementation as teachers provided feedback. Once the program was launched, this two-way flow of information was indispensable for customizing the program to meet teacher needs in the classroom and quickly fixing areas where they felt the program fell short of their expectations. It also created a team atmosphere that invested people in the process.



The second critical success factor is the presence of *well-designed, mandatory professional development*. It is not a secret that the more hours teachers are afforded to prepare their use of technology, the better the results. In this program, teachers received two full days of professional development over the summer, supplemented by "walk-in days" when they could come to school to discuss their use of the technologies with the Information Systems department and other teachers. The pilot cohort also participated in monthly meetings where they could share ideas about the use of technology in curriculum and instruction. All of this work was supported by an online learning management system that allowed teachers to post hints for colleagues, ask questions of the group and hear about other teachers' experiences.

Third, the District worked hard to ensure a *effective technical support* for the pilot. The goal was to minimize "down-time" so that teachers could rely upon the technology. This meant establishing a hotline to respond quickly to calls from the classroom, allowing easy access to



Information Systems personnel before and after school, and having an inventory of spare equipment available to replace broken tablets or accessories. Teachers who participated in the pilot remarked that they came to count on the reliability of the technology and that they felt very supported throughout the process both at school and off campus (Table 7). This reliability allowed teachers to more fully implement the tools.

Finally, the entire pilot was managed using *structured project management* techniques. A work breakdown structure listed all of the tasks that needed to be performed for the success of the pilot. A project plan broke the work into phases, assigned tasks to specific individuals and listed important milestones in each phase. The Information Systems department and the Educational Technology Committee met periodically to update the project plan, make adjustments and discuss the best ways to achieve project goals.

Program Evaluation and Expansion: In December 2006, after studying the data outlined above and speaking with the Superintendent and Board of Education regarding District resources, the Educational Technology Committee voted unanimously to extend these technologies to any interested teachers at Hunterdon Central during 2006-07. The committee also voted to extend the model classroom equipment to every classroom at Central by the summer of 2008.

Non-pilot teachers were already familiar with the pilot through in-service presentations done by their colleagues, as well as through informal conversations with pilot participants, and many were eager to take part. A faculty meeting was held to outline the entire program, especially the considerable professional development commitment required to participate. After the presentation, an online survey was conducted to gauge teacher interest level. More than 170 teachers, almost 85% of the remaining faculty, volunteered for the program.

Preparations for the Second Cohort: Because of the pilot's success, beginning in January 2006, Hunterdon Central began preparations for its second cohort. This process included a teacher participant selection, revision of the first cohort's curriculum, instructor selection for the professional development courses, purchase and configuration of equipment and extension of the educational research program.

As mentioned above, the District received an enormous response to the program, with over 170 teachers volunteering to take part in the second year. For budgetary reasons, the District could not fund tablets for all interested teachers during the 2006-07 academic year. To resolve this difficulty, a lottery was held by department, and a cross-section of 113 teachers were chosen to receive tablets during the summer of 2006, with the remainder receiving tablets in the summer of 2007.

The District employed the teachers from the first year tablet pilot to write the summer professional development curriculum for the new group of users. This process began with an

evaluation and then moved to incorporate hands-on examples from classrooms during the first year. The curriculum was made available on the District's online learning management system and was supported by step-by-step instructions, online tutorials, videos, webcasts and frequently asked question sheets. This content is available for reference throughout the year, both onsite and at home, each and every day at any time.

The original cohort also served as the pool of instructors for the summer professional development. Twenty-two of the original cohort members taught the new tablet teacher classes in the summer of 2006. Each class was staffed with a pair of teachers as a team to support 8-13 "students." There were a total 22 classes for the 113 new tablet teachers for almost 200 hours of offered professional development, at least 16 hours for each teacher in the program. In addition, there were seven days set aside at the end of the summer for teachers to meet with experienced tablet users to prepare for the fall. These "drop in" days afforded the new tablet teacher an opportunity to practice their skills, ask questions and learn some tips and tricks. Teachers who took advantage of the drop in days participated in as much as 25 hours of on-site professional development. The evaluations from these classes showed that the second cohort had an extremely positive experience with the sessions and felt prepared to use the tablets in the fall.

The Information Systems department began purchasing and configuring the equipment while also launching a project to extend the classroom model to every instructional room. This classroom model consists of:

-a tablet PC for each teacher
-a mounted, networked LCD projector and screen
-a DVD/VCR/CD combo player
-a multimedia sound system including a mixer, amplifier and speakers
-a networked printer
-access to a school-wide wireless infrastructure

The model was successful deployed to all rooms with the exception of the networked projectors. Because of budget constraints, 51 rooms maintained their non-networked projectors and tablet PC teachers must connect to these via a cable rather than using the wireless system. These rooms are scheduled to receive a wireless projector in the summer of 2007.

Research on the program continued as well. Teachers once again participated in surveys that asked them about their use of technology in their practice, both in and out of the classroom, and reflected on their use of the tablet in journal entries. Throughout the 2006-07 academic year, the Director of Information Systems and the Manager of Instructional Technology compiled research results and lead the Educational Technology Committee through the preparation of the Three Year District Technology Plan for 2007-2010

Two-Year Program Results: The second year research on the tablet program has reinforced the findings from the original cohort and has added other insights into the benefits of this tool as used at Hunterdon Central.

Teacher comfort with the tool is serving as a gateway for the use of other technologies in the classroom such as the District's learning management system and read/write web technologies

Year Three and Beyond: When combined with the distribution of tablets to administrators and selected staff members, the school will have almost 300 tablets in use by September 2007. The school will also extend the wireless network to include playing fields and other non-classroom space as well as replacing remaining wired projector with wireless networked models by the end of the summer. This will provide a fully wirelessly accessible campus.

In Their Own Words – Teachers Talk about the Tablet Technology

As the independent researcher coded teacher responses to the pilot, the following five themes arose with the greatest frequency:

- Flexibility in Classroom Instruction
- Student Engagement
- Teacher Productivity Anytime and Anywhere
- Organization
- Teacher Empowerment

The next section will discuss each theme briefly and provide quotes from teachers supporting these views.

1. Flexibility in Classroom Instruction: This was the most prevalent theme in the data. Wherever it appeared, teachers commented that they felt better able to meet student learning needs instantaneously in a variety of impromptu ways, including writing on the Tablet, accessing files, and pulling in information or images from the Internet. Teacher quotes that speak to this theme are as follows:

> "I'm to the point where I can even use the tablet's functions on the fly. For example, when discussing women's roles in Beowulf, my class was struggling with the idea that Grendel's mother and Modthryth were described using nouns and pronouns typically reserved for male characters. So, I froze the screen while they continued the discussion, pulled up a picture of Marion Jones, and one of Serena Williams, and then unfroze the picture. I then asked the kids to describe the women they saw on the screen. They came up with 'beasts,' 'monsters,' 'butch,' 'powerful,' 'strong,' etc. Then we used those terms to talk about female stereotypes and why masculine women are seen as 'monstrous.' From there we discussed other contemporary women who fulfill the feminine stereotype and whenever another woman came up, I would pull up a picture of her to compare to the 'beastly' athletes that were already on the screen. I was pretty proud of that lesson. The kids even said that it was fun."

> " . . . if a teachable moment comes up, we'll go in that direction . . . like working with Vietnam, trying to show them where things are . . . tracing around on the map . . . able to go on tangents . . . "

> " . . . you have that instantaneous conversation when a kid brings something up, when I'm thinking about things like I always do, to have things pre-set up for the right moment, gives me so much more content at my fingertips, have it in my head, but don't have time to draw that picture every time."

> " . . . when I generate my own PowerPoint, being able to ink or annotate on top of the information, to highlight it, particularly for 9th graders, ESL students, special ed students . . . to go through the note-taking process with them, that they don't have to write it all down . . . to show them the steps you go through"

2. Student Engagement: This theme came up nearly as often as the first. Teachers communicated that the Tablet allowed them to connect to students in some new ways, by sharing the tool with the students, customizing lessons and screen images, and differentiating instruction in the classroom. Teacher quotes that speak to this theme are as follows:

> "I think that my main success has been the focus that the students have had within the classroom. I think that the students actually love to be able to give their own input and as one had said, their thoughts and information are not immediately erased or disregarded. I think that this is really important to have the students feel like they are able to give input."
>
> "Another reason I am interested in the tablet for students is that I hate the way the monitor comes between the student and the rest of the room environment. Laptops do the same thing when the screens are up."
>
> "My kids love it, participation is higher than ever before, and I think I'm a better and more prepared teacher because of it."
>
> "I have noticed that the tablet has not only enhanced the motivation, but also the ability to address the different learning modalities . . . kids have commented on the ability to see, hear, and many times feel the content being taught."
>
> "I think that the tablet connection with the projector is by far my favorite aspect of working with the tablet. I like being able to walk around the classroom, allowing me to be able to make sure all students are on task as well, being able to display information on the board at any time. I think that being in a special education classroom this is very important. I always have whatever I am doing on the projector as well in front of the students. The students are now being able to learn in many ways. They are learning visually from afar and close up, they are learning auditorally and they are able to participate by writing the information down on the paper they have and many times on the tablet."
>
> "I'm not doing anything special--just putting backgrounds up there; I can put a definition up, but if I have a catchy background, kids are more likely to look at it--background on PowerPoint, some of the things he's doing are really very simple, but the images he's found are very engaging."
>
> " . . . a kid…in front, did something on the side board, the whiteboard . . . he drew the altitude incorrectly, made a typical mistake and got red in the face up there. I said I was happy you did that…which is why later in class I gave him the tablet and he got it right."

3. Teacher Productivity: Most teachers commented on the productivity gains they experienced from having access to a computer with all of their files anytime and anywhere. Such gains included making hall duty more effective, not competing for space in teacher workrooms, collaborating with colleagues on the spot, and instantly tailoring lessons to students' needs throughout the school day. Teacher quotes that speak to this theme are as follows:

"The work load is the same, however, I am using my time more efficiently . . .in the past on hall duty, I'd grade papers, now I can work on lesson plans, I can go in and I can change something that didn't work well right away . . . now I make full use of my prep. I don't have to wait."

"I'm being more efficient, making better use of my time. I'm changing my plans more readily because it's easier for me to do it. I find myself, if I have a free period after I teach, that I can go immediately and make changes. It's really easy. I see myself this semester as a better teacher because I'm able to make instant changes before I forget them. This is making it much easier for me to reflect and make changes as a result of my reflection."

"Having a computer on demand is wonderful. The days of waiting for machines during prep and being unproductive during duties are gone."

"I use this for my attendance, emails, contacts for study skills, updating my web site, and making worksheets and activities for my classes. I love having this at my finger tips."

"The portability of my tablet has allowed me to take my work with me anywhere I want or need to go. I can have my tablet with me doing my work while making photocopies allowing me to be more efficient in the use of my time."

"I am beginning to get the hang of the tablet, at first it was very frustrating and hard to navigate. Now it has become part of me and has created less paper work and has made my day more productive. I am able to spend more time conversing with my students before and after class since I do not have to find a computer and take attendance. I can be in the locker room supervising, checking my email, taking attendance, conversing with the students, or taking care of my students' concerns and questions. I think the word multi-tasking comes to mind. I would assume this holds true for most of us. I am now able to get more done during my prep since I am not wasting time with email."

4. Organization: There was a strong feeling among the cohort members that this tool helped them become more organized. They also pointed out the ways in which they customized the variety of organizational features of the tool to meet their individual needs. Teacher quotes that speak to this theme are as follows:

"I have been using it primarily as an organizational tool. As I mentioned…it is now my new clipboard. I no longer flip papers back and forth on a clipboard; rather, I click throughout my Excel spreadsheets, P-drive, or Binder Lite. . . . It's like the planner that I always carried with me anyway. I set up two "binders" in the program, one that is all HCRHS, and one that is for my grad class. I am trying very hard to go paperless. It is limiting the amount of 'stuff' that I lug around."

"I think that before I had [the tablet] I was probably a little less organized . . . now I have everything in front of me all the time . . . it organizes my files. . . . I'm teaching how I'm meant to teach."

"Everything's sort of together this year . . . it just felt very organized. . . . I can carry everything around with me all the time. I'm using technology every day. I don't have papers flying all over the place like I used to. . . . I feel very satisfied with my teaching."

"I feel more organized and prepared. . . . I am able to take notes in class and view them anytime I want. . . . It comes in handy when you have three classes in a row and 90 students... I am able to capture my student's questions and input daily so I can improve my lesson plans and their productivity."

5. Teacher Empowerment: Teachers repeatedly commented that they felt more invested in and excited about their practice. Participating in this cohort also helped them feel more invested in the greater school community. Teacher quotes that speak to this theme are as follows:

"This has been the most fun and exciting month of my teaching career--after 14 years, that's saying a lot. . . . I'm learning something new everyday. This makes it a fun experience for both the students and myself."

" . . . these awesome tools that I feel have enhanced my teaching, my organization, and most importantly, student learning in my classroom."

"I find it empowering."

"I feel much more visible with it; not that I felt I wasn't before; but more visible, more like I'm contributing, although with my department I always felt I was a contributor, but now more so. I'm much more engaged and invested in the school."

"I love this model and can't wait to get to class each day. It makes each lesson unique, even when I am just creating notes, or showing a PowerPoint. I have taken baby-steps to get acquainted with the systems, but am feeling more and more confident with each passing day. Recently I used the tablet to help the class work on filling out a flow chart, and then today annotated on a PowerPoint for the first time…very cool! I have also been using the tablet during my Hall Duty and have been able to get some work done on future tablet lessons. I have received many curious looks from the students who pass me by as I am working (It could be the Rage Against the Machine or Green Day flowing from the laptop, but I think they are intrigued about the tablet itself as well). My students have been very receptive to the tablet and want to use it themselves everyday."

"It certainly raises your feelings of professionalism and empowerment. . . . having the right tools to demonstrate that makes you feel good about yourself and your ability to do things with them."