



## **Teacher Perceptions of Student Change in FY00 eMINTS Classrooms**



**Susan Tharp**

**February 2001**

February 25, 2001

## **Teacher Perceptions of Student Change in FY00 eMINTS Classrooms**

Findings about the 1999-2000 school year are reported from qualitative interviews with eMINTS classroom teachers. Teacher perceptions about the initial impact of the program on their students are described. As students began working in new eMINTS classrooms teachers noticed changes with respect to: 1) student motivation, 2) classroom climate, and 3) student performance. These impacts are generally consistent with changes described by the MINTS teachers.

### **Introduction**

Teachers reported that full implementation of the eMINTS classrooms had a profound, direct and immediate impact on their students. Full implementation included significant technical and instructional training for the teachers, teacher workstations, projectors, SMART Boards, one high speed Internet connected workstation for every two students, and new classroom furniture.

Teacher comments were gathered shortly after the full installation of eMINTS classrooms. These classrooms had been fully functioning from ten days to fifteen weeks when the evaluators visited between March 1 and May 20, 2000.

The teachers reported three general changes in their classrooms:

- 1) Students' motivation to work increased. Students are so motivated to use the computers that they ask for more computer time in lieu of recess. Students were more focused and stayed on task longer. Students improved their writing, researching, and math skills.
- 2) The classroom climate changed. Discipline was not a problem as students participated in active learning. Students cooperated as partners and in groups, teaching each other and developing a learning community. Students gained confidence and improved self-esteem. Students developed higher order thinking skills.
- 3) Student performance improved. Different categories of students showed various types of improvement in performance. At-risk students and those with special needs showed evidence of substantial progress towards grade-level performance. "Average" students showed improved mastery and creativity in their work. And "gifted" students used the resources to explore subjects and projects to the extent of their abilities.

*This report is one product of the eMINTS evaluation project. Other reports and information about evaluation activities are available at <http://emints.more.net/evaluation>.*

*The eMINTS Evaluation focuses on understanding the program's impacts on students and teachers, the changes in learning environment in eMINTS classrooms and the use and outcome of project services.*

Teacher comments were collected through extended qualitative interviews conducted with each eMINTS teacher participating in the first year of the program. The interviews addressed several topics, from the professional development issues to furniture selection. The comments below address the impacts of the eMINTS program on students. Most of the comments about student impact were positive. These comments were made within four months of installation, and may reflect teachers' first impressions of their student's work in the eMINTS classroom. Further interviews in the 2000-2001 school year will address these issues.

These findings support the conclusions of the MINTs evaluation. Generally, the MINTs evaluation documented changes in student motivation, skills, self-esteem, and performance. These changes were generally attributed to a change in the role of students from passive to active learners.

### **Increases In Student Motivation**

With the new interactive learning resources available in the classroom, both teachers and students have a renewed excitement about school. Teachers found that students are so highly motivated that they often want to work through recess to continue researching on the Internet or to continue designing their PowerPoint presentation. One teacher reported:

They're excited every single day. When they come in and read the assignment board for the day...when they see a www or a dot com...they're excited. They love it. They do quality work when they are on [the Internet].

### *Students Would Like To Spend More Time Using Computers*

When using the computers, students become so engrossed with their work that they often do not want to stop. One teacher described her students "begging" her to let them continue when time for a study area expired. "If I was doing that with a textbook...they would have cared less. But, because it was on the computer, it motivated them to want to go in and look for more information. So it's just amazing." This same teacher claims that when she uses the SMART Board, students watch her "closely because they're so interested in it." She sees them modeling something new that she did, even though she did not explain how to do it. It shocked her how much they pay attention when she is using the SMART Board because when using a chalkboard, "I could stand on my head and it probably wouldn't affect half of them."

Many times students would like to work during recess. Students writing in their journals using the computer surprised their teacher by saying, "I need some more time. Can I stay in at recess and write?" A twenty-year veteran of elementary education describes her students as "more excited to work." Her students also ask to stay in at recess. This teacher says, "I have to just beg them to log off the computer to go to PE and Music. I have never had that before."

Some teachers admit using this enthusiasm for the computers as a bribe for better behavior or more timely completion of other work. One teacher mentions a “behavior disordered child” who is very intelligent. “Getting him interested at the beginning of the day and knowing that he’s going to get to do certain things on the computer helps curtail his negative behavior a little bit...”

### *Students Improve Ability To Focus And Stay On Task*

Teachers report that most students are better able to focus and stay on-task when they are using the computers. “My class worked for an hour and a half straight, when their attention span is normally 15 minutes.” Teachers are also noticing that some problem students are missing less school.

Another teacher recounts that, “any time I say, ‘Okay. Let’s go over to the computers now’...their eyes light up and they’re just with you the whole time. There’s not any moans, groans, and they’re paying attention.”

One teacher was concerned about having so many computers in her classroom and the disruption they might cause. She was pleasantly surprised to find that her students were not disruptive, but stayed focused on their work.

When they [MINTs teachers] talked to us about behavior...I was [a] little apprehensive at first because I know what it’s like to have 3 computers in the room...but when they told us the students would really be on task, that is the truth. When they have something that they have to do, they are definitely on task. It captivates them so much more than just regular textbook teaching.

Teachers reported that most students with behavior problems are staying focused for longer periods of time.

I do have a little fellow who is ADHD, who has great difficulty staying on task. With this, I hardly have had to say a word to him about getting back to work or staying focused on what he is supposed to be doing. He is my outstanding example.

In only five percent of the classrooms, teachers found the computers were distracting or were not the motivator they had hoped they would be.

I have about three students...that have so many other problems that this isn’t motivating them the way I hoped it would...I thought maybe this would really turn them on and really get them going, but they can’t seem to...focus on that...I have an attention deficit child that still has trouble focusing...It’s just one more thing that distracts him.

In talking with the teachers it became obvious that most of these problems occurred when only part of the class was allowed to use the computers. One teacher found that by using the interactive technologies available in her eMINTS classroom, her students enjoyed school more. "It has opened up a whole new world...I would say that all but maybe one of my students is even more excited about coming to school and about learning in a different way..."

### *Regular Computer Usage Has Helped Students Improve Their Skills*

While in the eMINTS classrooms, students have improved their writing and researching skills. Math practice using the computers has made drill work more enticing to students. The MINTS project linked the improvement of student writing skills with the increase in number of student presentations and also the pride associated with printing a creation with the computer printer.

### Literacy Skills Improve

Due to the use of a word processing program, students are improving the quality of their writing. In the words of one teacher:

They seem to be much more aware of the quality of the work that they generate...Primarily, it's because of the different corrective factors that are already involved in programs like Microsoft Word, the little green squiggly lines and the little red squiggly lines, and when those come up they're just automatically very distraught and want to know the reason why, which makes them much more careful and much more in tune to their grammar and their correct use of language.

Students are using multiple sources for vocabulary information. Some teachers are finding their eMINTS students more inclined to look up the meaning of words they are unfamiliar with by quickly looking at the Word Central website. "I've also noticed that they have a tendency to use the dictionary, the book dictionary, more now, even though I have an online dictionary...and I see that pretty frequently throughout the room." Teachers reported that computer usage enhanced formal vocabulary study also. When students wrote definitions, one teacher noticed, "...You can tell that there's a deeper understanding..." of the words.

Teachers found that by using the computers, students were able to complete more writing assignments. One teacher stated, "...When they're at the computer it seems like they're producing more. They're producing better work." Another teacher noticed that before eMINTS "to try to get them to write was like pulling teeth. They hated it. Now they really want to fill up the page, not...[like the] one sentence that they've normally done in the past."

### Researching Skills Improve

Students have greatly improved their researching skills and are more excited about delving deeper into subject areas. With access to the Internet within easy reach, eMINTS

students are stimulated to explore the Internet for additional information for specific projects.

They've been more motivated to continue and not just give up...If we look at a book or an encyclopedia, they don't want to pull facts out of that at all, but if we go to the Internet, they're ready to click on the websites and find out the information so they're more motivated to research.

Some eMINTS classrooms are using the Internet not only to complete lessons but also to answer new questions that arise. After a unit on the solar system, one teacher stated:

They had researched a planet, and...there were a lot of topics that they were interested in. So they each took a topic, whether it be the astronauts, the history of space travel, solar eclipses...and then they researched that topic, which was great. I've never been able to do that...because when you do the KWL<sup>1</sup> and you come out with these grand questions...you don't have the resources to...go in and research...I was able to let them take their question, find some sites and then they could go and research their own question.

One teacher noticed that her unit on famous Americans was much different this year. Parents reported that their children "would come home and tell them all these facts that they knew about their famous American." The teacher said, "That has been a plus, because I haven't seen that [before]." She attributed the enthusiasm to their being able to search the Internet for information.

### Mathematics Skills Improve

Teachers have used Internet sites for teaching overall concepts as well as drill work in mathematics. Students find the three-dimensional visuals stimulating.

...I stumbled across a multiplication introduction site...and it opened the door for a lot of children...it worked very well as an introductory and then as reinforcement now.

A teacher shared a story about student motivation and computer math.

I've seen results in kids already. One of my kids found math football and I looked at it and it was decimals and I said, 'Sorry I don't have time to teach you decimals now'...within five minutes he learned how to add and subtract decimals just because he wanted to play that football game, and this [is] one of my better students. He knows how to add and subtract decimals. Two days later I saw one of my LD students who is on a primer reading level, he was doing the decimals in the football game...Apparently it had traveled around the room...And they were

---

<sup>1</sup> An instructional technique created by Ogle whereby teachers activate students' prior knowledge by asking what they Know, then students specify what they Want to learn and after reading, discuss what they have Learned.

just teaching themselves how to add and subtract decimals because they wanted to play this whole game on FunBrain there...That was just unbelievable.

### **Interactive Technology Has Changed The Classroom Climate**

At first teachers were anxious that this new program might disrupt their classroom. Instead, teachers found that using these interactive learning resources increased student cooperation and decreased the need for classroom discipline. Students actively engaged in their own learning were more excited about learning and retained the information better.

#### *Classroom Discipline*

Teachers' responses to classroom discipline vary. A classroom where inquiry-based teaching occurs cannot be as rigidly controlled as a traditional classroom. This new environment stimulates some teachers and some students, while others find it chaotic. Selected comments from teachers include:

---

The discipline problems are almost nil when the computers are on and they're working with them.

---

When they get on that computer, they focus on what they're doing. And I think they just don't have time to be goofing around, or they're so interested...it's just not as interesting when I'm up there. Just direct instruction, that's not interesting to them.

---

When they're actually on the computers, I notice that they do not follow through with our classroom rules, you know, of raising their hand and speaking, and those type things. However, they're not criticizing others and doing negative-type things either. They're just not following through with our regular classroom rules.

---

I've had fewer discipline problems...they realize that you have to work together with your partner cooperatively or you're not part of the program...so they're really, really trying to get along with each other and make it work...like you have to in the real world.

One teacher described a day in her eMINTS classroom as she adjusted to a new classroom environment.

It sounded like mass chaos and when I looked up from what I was working on...to hush them. It was just...controlled mass chaos. I had groups working on looking at different kinds of animals on Yahoo!igans...I had a group working on their PowerPoints, summarizing a chapter book we'd just finished. And I had a group that were finishing up typing a paragraph on how to make pizzas. And I had a group back there putting together a PowerPoint...That's not even one of

their assignments, but I asked them to summarize a previous chapter in science and they were doing a search and finishing up a summarization of the science body unit. Just had all different kinds of activities going on...but, when I looked at them they were all focused on their computers and on their tasks and were doing something constructive. So I never did tell them to hush...I've realized that I've let go of the classroom management a little bit and realized that there's a shift.

### *Active Learning*

Learning that occurs when students are involved in their own learning process is different than what occurs in traditional classrooms. The eMINTS classroom is designed to actively engage students in inquiry, investigation, and discovery. One teacher noticed a change in her students as they searched the Internet for information about the heart.

...They found all kinds of websites. And I discovered that when they did that, they took ownership of their learning...They'll always remember that website and the information that they learned...but when they discovered it on their own...it was like electricity going off in here. I mean, the excitement was so high. And that was a big discovery for me...I was just amazed.

Active learning led to better test scores when a teacher noticed the difference during her unit on famous Missourians. This year the children did their research on the computers and in lieu of a book report they became the famous Missourian in a living museum forum. The students were allowed to find what they wanted to learn about these Missourians. The students were so motivated, they not only learned about their character, but also knew everyone else's. The teacher guaranteed that the test scores were "a hundred percent better."

The high speed Internet connection opened the world to students and showed subjects in a new light. One classroom had a poetry site sent to them over the Internet. Their teacher told the evaluator how impressed she was with her fourth grade students as they looked at this site. "...'Oh, look at this one. And look at this one.'...I couldn't believe how excited they were about poetry."

Students took more responsibility for their own learning. One teacher overheard her students saying, "Wait. Oh no, we can figure that out. Don't ask her." She stated that usually she heard, "We can't do this. We can't do that. Where do I go to get that?" She happily reports hearing a new set of questions. "Can we see what this does? Can I try that?"

A teacher remarked, "You know I'm really excited that my kids are so excited about learning any more. They're very, very motivated...I knew it would be motivating. I think I'm a little overwhelmed by how important it is to them." A teacher who has been teaching for twenty-seven years predicts:

This is something that I think is going to make an impact on my students more than anything I've ever seen come through...It's something that they are finding on their own. When they own it, it's theirs. They're not going to lose that knowledge...I think this is just going to change their entire focus of education. Besides learning how to use a computer...but just their knowledge that they're gaining in finding those discoveries on their own...It's changed my idea of teaching a lot.

### **Computers Facilitate Cooperative Learning**

The earlier MINTs project found that “as students work cooperatively, the overall climate of the classroom changes. Students contribute to each other's projects and work to build a supportive learning environment. As the learning environment changes, students take greater responsibility for learning and developing each other's skills.” The same can be said for students in eMINTS classrooms. Over half of the teachers stated that the eMINTS program was valuable in teaching students to work cooperatively. With shared computers, students learned how to work in pairs and small groups. Researchers noticed that student interaction must be managed by the classroom teacher in order to maintain this active and cooperative learning environment.

#### *Cooperation as Partners*

Teachers' interventions were needed to set up student groupings for computer usage. When pairs were methodically chosen, the students were much more likely to work well as a team.

When teachers logically paired the students, they considered areas such as computer experience, reading ability, manual dexterity, and temperament. “I purposely put groups together, stronger [with] weaker students, pairing them off that way, where they could help each other. And in most cases, it worked out beautifully and they did their own work and they've all come up with a little bit different twist.” Other teachers randomly paired their students. This method was usually not successful. “I let the children choose who they wanted to work with. I thought they could get along better. But, I found out they didn't and I've had to move a few.”

For many students, working together was a new experience they enjoyed.

Cooperation between the students is unbelievable, especially when you have to share a computer. In fact, my students have written about that, how learning to share is a big thing and they've learned to do that.

---

I wish you would have heard two of my students at the front of the room say, ‘We really like being partners. We're so glad we're sitting together. We work well together and it's just fun and we just like each other.’ I thought that was so positive.

For some students sharing a computer and working in a team was difficult but helped them improve their social skills.

...There are some who are very independent, want to work by themselves...and one of my groups in particular was having almost a knock down drag out over who got to...run the mouse...[With a] type of ticket...they could run the mouse...that was a solution that they did on their own. So, just the social things, not only just the academic, but the social part of it is coming along.

---

The communication skills are getting better. They have to learn to work out problems with their fellow students. They used to have nit-picky fights about this and that, and if they don't solve it then that's their time they could be using on the computer.

### *Peer Teaching*

Teachers are finding that students are very eager to help each other and that positive learning experiences occur as they teach each other.

If they get finished with an assignment, well, they'll jump over and help someone and they really work well together.

---

The strong girls [3 high level students] aren't being the hogs, they're actually letting the other child manipulate the mouse or go into the site or type this address in or whatever, so that they've actually taught them. It's made my job and everything a lot easier.

---

I know what it's doing for these kids. I can see the difference in them. And I can see their excitement. I can see how they're really taking control of their own learning. My stronger students are helping my weaker students open up doors in their lives where they've never thought that they [would go]...they were so afraid to touch a mouse before.

### *Classroom As Community*

The teacher is central to creating a constructivist environment where students can work together in an active and cooperative learning community. Teachers shared examples of students working together in an eMINTS classroom.

...When somebody has a problem...they don't even think about it anymore. They go, 'Oh, here's how you do it.' They're helping each other out just automatically...And [watching] the kids taking on new leadership roles has been really interesting, because the ones that used to be the leaders aren't necessarily the leaders right now.

---

When one discovers how to do something, somehow it just kind of filters off everywhere, and the next thing you know, they all know how to do it, and you never said a word.

---

They are working rather well in groups with an exception here or there. And they help one another. There's a great deal more of that than there was before...They're being real responsible and [it's] not as hard to manage as I thought it would be, with everybody doing something different.

### **Students Gained Confidence And Improved Self-Esteem With Computer Usage**

Teachers report that the technology-rich classrooms enhance student academic skills. This new classroom also plays a significant role in students' social and emotional growth. Teachers have noticed an increase in self-esteem and confidence in many students. Often this is with students who, for some reason, do not fit well in the traditional classroom such as those who are slow readers, have poor handwriting, are socially or economically disadvantaged, or are more academically capable than their peers. Teachers state that these interactive learning resources have often "leveled the playing field."

#### *Self Esteem*

Teachers saw quiet students or those with low self-esteem "really blossom." One teacher found that when her eMINTS students felt successful, their self-esteem "sky rocketed." One teacher pointed out a little girl who was especially quiet and shy. When her classmates were nearly in tears because of a problem copying on the computer, the girl said that she could fix it. The teacher let her try, and she knew exactly what to do. Now she is called a "little computer expert." She was so proud of herself for rescuing her classmates.

The abilities of their peers can make students with disabilities feel less competent, lowering self-esteem. eMINTS classrooms have helped students who are having difficulty, feel a sense of achievement in completing difficult tasks. One teacher noticed that one of her LD students was able to show others and train his peers, instead of their usually having to show him. He was proud.

One teacher reported that, "I have kids who have really severe learning disabilities and...they feel accomplishment." She reported that they could find something on the Internet that is at their reading level.

...Since they're reading on a first grade level, they can't read the textbook I have, so answering the questions is really hard unless somebody else reads the thing to them and reads the question to them. Whereas, if they go out and find a section that is on their level, which a lot of them have, all of a sudden they don't have to ask me to read...I think it allows the kids to be more successful on their own level, which is so hard to do.

One teacher shared how eMINTS helped to include a special needs student into the regular classroom.

The kids that are on the lower end...I have one that is only in here for an hour a day. The rest of the time she's in her class, her special class...It's given her the ability to do something that the rest of the class is doing that she doesn't normally get to do. She got to create a presentation about herself, to show her Mom, just like everybody else did, and so it kind of brought her back into the class and made her feel even more a part of it.

The MINTS project also found an increase in students' self-esteem, as the students were able to complete work they once thought were beyond their current abilities.

### *Confidence*

Before eMINTS, teachers claimed many students were reluctant to get up in front of the class and give an explanation. Since the introduction of the SMART Board and computers into the classroom, the students have gained confidence. A fourth grade eMINTS teacher said that she feels like her students have come out of their shell. When her class has any visitors, her students want to demonstrate the SMART Board. A female student, who would not have even wanted to talk, now gets up and "talks away," like she's been doing it forever.

Whether it's the computers doing it, or maybe the change in the classroom or maybe the change in me, I just feel like they've really opened up as a class since we've had this technology and are real confident...I don't know if I can contribute [attribute] all of that to the computers, but that's when it changed, so who knows.

Another teacher reported that one of her lowest students learned how to get clip art off the web. She moved around the room and helped her classmates. "She was up with the high students, showing them how to cut and copy and paste...She just took off. I've seen a big improvement as far as self-confidence with things."

The computers motivate high-risk students.

The lower end students also love it, but for a different reason...They get to a site, they push a button, click the mouse, 'My god I'm here.' It's unbelievable, and their expectations aren't as high as some of my other students, but they, as a group, they're all experiencing happiness and success, accomplishment...Yeah, [it's a] very positive influence.

Self-confidence is often a stumbling block for high-risk students. High-risk students can make things happen with a computer, bolstering their confidence. As one teacher points out.

...Because it's all step by step, and the visual icons are there, those cues are there, he was able to go find those things just as well, so for him...[It] is 'Hey, I can do this too...this computer stuff...I can add to this truly as a group and not feel like I have to be able to read as well as everybody else, and write as well as everybody. I'm still a part of it.'...He's even been able to point out some things that he's remembered. 'Oh I know how to do that...'Imagine...the self-confidence...that's probably going to be a big thing that's going to help him academically. Just that confidence thing is where they get stuck sometimes.

### **Giving Students What They Need: Interactive Technologies Provides Appropriate Tools To Three Different Groups Of Students**

Teachers are finding that the enhanced learning environment provides appropriate tools and resources to three broad classes of students. At-risk students are motivated to try, average learners are stimulated, and gifted students are excited about exploring new areas.

#### *At-Risk Students*

High-risk students were better able to stay focused and on-task with computer use. Teachers found that the anticipation of time on the computer encouraged improved behavior. The at-risk students have more motivation, have found strengths of which they were unaware, and have found solutions to previous learning problems.

#### Behavior of At-Risk Students

Teachers recounted numerous instances of improved behavior in high-risk students. Before the technology component was introduced in one classroom, one young man's behavior problem included banging his head on the desk. The teacher has documented that, "He regularly gave put-downs. He was the first to throw a fit and not work. I mean, we had temper tantrums galore prior to December...January, we had less temper tantrums...March, he hasn't had one."

A fourth grade eMINTS teacher also singled out a young man who was "very much a behavior problem." The fourth grader had already been retained in a grade. Another teacher in the building referred to him as a *discouraged learner*; and he referred to himself as *stupid*. His reading was at a second grade level and he has very low self-esteem. The eMINTS teacher said that he is very interested in the computers and when he is on the computer, he doesn't refer to himself as stupid, and "is not a behavior problem at all." He can now design web pages. He has guided visitors on the use of technology in his class. He writes, *please let me stay in fourth grade*. Both he and his parents want this young man to be retained again as they think he can make strides with another year in this eMINTS classroom.

Some teachers found that the promise of time on the computer provided the motivation some students needed to improve their behavior. "Off the wall" is how another young man was described. The computers really motivated him to use self-control because he knows if he doesn't he will be off the computer. "For that alone, I thank eMINTS because, I've really been able to do other things with the other students than constantly having to focus my attention on one person." She felt that this child was a real challenge before eMINTS. Another teacher related that a child with a behavioral disability knows that he cannot come to her class unless he behaves in the morning with the special education teacher. "It's a motivational type thing."

Many teachers reported that the technology increased motivation with their high-risk students.

I see with the lower ones...that the interest is so much greater. It's almost as though, when they were in the books, some of them were almost defeated before they started. They weren't even willing to try. They'd dealt with that so much, but this is like new and different and they don't feel defeated because they've worked on the computers.

A teacher described a learning disabled student who was "just unmotivated in the worst way." But now when she puts up the question of the day, he's the first to find the answer. She attributes eMINTS with motivating him to want to do the work. Other teachers reported this same information. A teacher said that her students with special needs stay on task more, pay attention more, and stay interested longer, if their work is on the computer.

A few teachers found that it was not the motivator they had hoped it would be for their low achievers.

So far it hasn't helped the behavior problems...It has motivated some to do more, but not as many as I thought. The ones that never do any work anyway, all they want to do is play some of the games...When we get to the regular work, they don't do any more than they do in regular class...

Teachers reported that students were proud to have the equipment in their classroom and treated it with respect. Only one teacher had students who were not careful with the equipment. "I have a couple of students who have...such behavioral concerns...that I'm not sure they need to continue on in the program because I'm afraid that if their behavior is not controlled, that they will damage equipment...because they just don't have any sense that this is something that they're not supposed to destroy." This was an isolated situation.

### Students With Special Needs Improve Skills

Educators continue to search for interventions to improve skills of those students in the eMINTS classes identified as having special needs. Teachers reported a boost in literacy skills for these students. As one teacher put it, "I've got some low students who, if you put it on the Internet, even if it's the same exact assignment or you put it on the computer

screen, they do so much better. I think that has helped them because their grades have gone up."

A second teacher discussed one of her students with a low reading level. Since the arrival of the computers, "he teaches the kids the steps on how to put a screen saver on, and he has to read to do that." She continues, "I told his mother the other night that I thought that he had improved greatly because of the computers, because he wants to get on there and find things that he will read." Another teacher shared this story.

I have one, especially, that's low in reading and writing and we have them write out sentences for their spelling words, and then put them onto the computer. And the work there is just unbelievable. Well, I had two and three word sentences out of him and now I have six and seven word sentences. And the enthusiasm. They don't want to miss school, at all.

Another teacher found that using the computer helped a student who had poor handwriting. "...And he's got very poor handwriting. But, his language grade has gone from like a D, low D, to a high B, just because he can type the sentences in...For him, it's very high. So, it's made a great deal of difference for him."

Students with special needs have also shown improvement in the breadth of their projects.

...They're probably two of my lower students, and it's just really ironic that they ended up working together. And going through and looking at their presentation, [it] was amazing to see the depth and the thought that went into each one of them...

Progress in spelling has also been noted. Teachers attribute this not only to Microsoft Word's spellchecker but also to the pride students are demonstrating in the quality of work that others will see. Some students, who were previously doing poorly in spelling, have improved their scores, "from going up and just interacting with the SMART Board, hands on."

In the MINTS project, teachers also reported that the "option of doing work on computers alleviated the common problems of communication." They found that ESL students and others with communication problems could use a variety of visual, auditory, and writing opportunities using the computer. These improved both student skills and confidence levels.

### *Average Students*

Teachers are noticing some changes with average students also, although they are not as dramatic as with other groups. "For my middle to upper kids, I'm seeing better work that I don't think that I would have realized if we had just the regular textbook curriculum.

I'm seeing some creativity that I don't think that I would have ever seen." Another teacher notes how the program is helping learners at all levels.

I have gifted in my class and the gifted kids, it's kind of brought them down, but it's also kind of put them on the same level. Because when we're researching something they have to go research just like everybody else and even if they might get done really quickly, then they're also experts on that, so then they can come back and help...The lower end kids, it kind of helps with the interest level and frustration level. And then, of course the middle kids are just, they're succeeding and they're enjoying it...I think it just helps them stay on track.

### *High Achieving Students*

Gifted and high achieving students are going beyond their assignments and exploring additional areas. Gifted students are no longer held back to wait for their classmates.

Because their presentations have just a little bit more in it, a detail a regular, average student might not think about adding, but it's something that interests them, so that gets their excitement level going because they find something in it that they think is really cool and then they'll research a little bit further.

One teacher recounted the story of a gifted student who described herself before the computers arrived as "an old-fashioned girl" who liked books.

[Now this girl] asks if she can stay in at recess. She wants to do her own WebQuest...She wanted to do one on dolphins and I said, 'We're not studying dolphins.' But in her spare time, she went ahead and put together a little PowerPoint on dolphins so she could share it with the class."

### *All Students Develop Higher-Order Thinking Skills*

Teachers in eMINTS classrooms have also reported seeing an increase in work quality and higher level thinking skills.

When I say quality work I mean something that they have put a lot of thought process into, and I'm seeing the higher order thinking skills coming through...not something that they just slapped on paper because it was due...I feel like when they've finished with something and they've spent the time on it, and they've been allowed to use the tools that were necessary to do that, they put their heart and soul in it, and I don't think that that's true with everything they do in that classroom otherwise."

After thirteen weeks of a fully equipped eMINTS classroom a teacher found her students more excited about learning.

I think they are expanding quite rapidly. And they ask more higher-level questions...and they are constantly trying to research to see if they can find that answer. And a lot of the students will ask, 'How do I find this on my computer at home?' And they'll go home and then come back in and tell me what they've done at home...

After using the computers for a science unit, one teacher gave her students the same unit test that she had given for many years. She found that her current students missed more of the multiple-choice questions than students had in prior years. But the significant difference came when she read the open-ended answers. They far surpassed those of any prior years. These students had understood the concepts and could write about them. One teacher summarizes how the program is affecting her classroom.

I'm no longer having to worry about always being in charge. And it's nice to be able to walk around and see what they're doing. And...with these kids who cannot possibly read ...Worrying about, are they...anywhere near with the rest of us? And then knowing that you almost feel like you're sometimes stifling those kids who are beyond what we're doing. And now I don't feel that way anymore because I know I'm reaching them all. I'm allowing them to all be working on their level.

## **Conclusion**

eMINTS has affected the learning environment. Teachers found it to be a classroom-changing experience. When eMINTS evaluators visited the schools and interviewed the teachers, all of the classrooms had been functioning for less than one full semester yet the teachers were beginning to see dramatic results. It is clear that the technology-rich eMINTS classroom provides an exciting, stimulating environment where students flourish. Teachers noted an increase in student motivation and focus as their students quickly learned how to use the SMART Board, the computer, and the Internet. Fast, easy access to the Internet allowed students to investigate and discover new information at their own pace. This abundant, convenient and readily accessible tool provided opportunity where self-motivation could translate into continued exploration. Their academic skills of reading, writing, and researching improved as their enthusiasm increased. Students' work improved as they showed more initiative and pride in their work.

An additional benefit of this program was the cooperative learning skills adopted by the students. Besides gaining these social competencies, they began to share information and learn from each other, making the classroom a true learning community. When teachers took responsibility for setting up the classroom, students worked together, teaching and helping each other. Students found new personal skills and increased self-confidence as they supported each other.

Teachers have seen a leveling of the playing field. Many high-risk students have improved their behavior and are motivated by the technology. Disinterested students were now performing alongside their classmates. Average learners are stimulated and excited about working as a team and are committing greater effort to their assignments. Gifted students are investigating more. Not having to conform to the pace of the rest of the class, they are free to extend their learning. Students are able to work at their own level and at their own pace thereby having control and ownership over their own learning. Students are getting what they need to achieve.

As teachers and students become even more familiar with the equipment and constructivist learning practices, we anticipate seeing a new classroom with a cooperative, active learning environment where students feel successful and can find and access the information they need.

Teachers' comments about student experiences in the eMINTS classrooms echo those of the MINTs teachers. In the MINTs evaluation, the implementation of an inquiry-based classroom environment motivated changes in student motivation and performance by changing the prevailing relationship of students to their work. In the MINTs classrooms the locus of control over learning is shifted to the students, and the students responded by demonstrating improvement in their activities and learning. The same appears to be happening in the eMINTS classrooms. The consistency of these accounts suggests that the change in teaching styles and orientation, rather than the installation of computers, is the major impact of the MINTs and eMINTS programs.