# HOW ARE TEACHERS AT A TECHNOLOGICALLY-ADVANCED NYC SCHOOL SITE INTEGRATING EDUCATIONAL TECHNOLOGY INTO THE CURRICULUM?

by

Camille LoParrino

[redacted]

Louis L. Vigliotti, Adjunct Professor

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ABSTRACT

The major focus of this paper is school teachers' integration of educational technology in their curriculum. Single studies made in Georgia, Pennsylvania, and Florida will be examined and a more complex study made in Michigan, Tennessee, Illinois, Montana, California, and Massachusetts which were later implemented among the Model School Partnerships in Hanau, Germany is also included. The results of technology-usage explained in these studies will be compared to the inclusion of technology at a technologically-advanced school site in NYC.

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| ADOPTION:<br>Critically assess assumptions about teaching and learning; Explore options for new roles | INVENTION/MATURITY/EXPERT TECHNOLOGY INTEGRATOR:<br>Good command of strategies and classroom management |
| ADAPTATION/ADJUSTMENT/TECH USER:<br>Shift towards student-centered classrooms, learning with technology, in a rich-learning environment | |

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| | |
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| FEAR AND UNCERTAINTY:<br>Hesitant, Fearful, Uncertain, Embarrassed, Needs Nurturing | NEW PERSPECTIVES:<br>New Vision, New Perspective of Teaching, New Connections, New Strategies |
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| Technology extends Objectives |
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| Collaboration of all Participants |
| Scaffolding for Understanding |
| Variety of tools:<br>*word processors *graphics *Internet *digital cameras *scanners |

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|---|
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| Establish planning time to maximize collaborative efforts |
| Utilize building-based methods that focus on the learning needs of their particular learners |
| Place the content *first* and a technology connection to the content *second* |
| Conduct grade-level classes that focus on the actual integration of technology into the curriculum |

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| TRIANGLE OF LEARNING | MODEL SCHOOLS PARTNERSHIP | LTARP |
|---|---|---|
| Student and Teacher | Educational Practice | Student and Teacher |
| Teacher and Teacher | Professional Culture | School Culture |
| Teacher and Administration | Technology Leadership and Management | Teacher and Administration |
| Community | School-community involvement and family | Parents and others |

## INTRODUCTION

How are teachers at a technologically-advanced NYC school site integrating educational technology into their curriculum?

Much has been written about how teachers and students are learning to use the latest technologies in their classrooms. These reports have addressed the conditions surrounding the actual learning environment itself and include interpretations of the methods, strategies, and products proposed to be necessary for teaching and learning with educational technology. After outlining the philosophies on how educational technology is being implemented into the schedules of teachers throughout the United States, these findings will be compared to the technology-based activities that were discovered at a NYC school site.

The particular school site discussed in this report was listed in the Council's Staff Report to the Committee on Technology in Government, Chaired by Councilwoman Gale A. Brewer, entitled "Expanding Digital Opportunities in New York City Public Schools: Profiles of the Innovators and Leaders Who Make a Difference."

## REVIEW OF RELEVANT LITERATURE

According to both theory and practice, this kind of teacher preparation is considered a transformational journey that includes various learning aspects. These aspects are categorized here within seven areas: Stages of Transformation, Journey of Transformation, Best Teaching Practices, Effective Learning Communities, Technology Skill Development, Professional Competency Plans, and Successful School Partnership.

## STAGES OF TRANSFORMATION

The growth process of in-service teachers has frequently been described as starting with survival, progressing through adjustment, and ultimately leading to some mature stage of effective functioning.

Research on teacher developmental stages is similar to technology integration stages. For example, Apple Classrooms of Tomorrow (ACOT), a research and development project, provided technology, training, and support to teachers, and discovered that teachers went through a five-stage evolution process as they learned to integrate technology into their curriculum: *Entry, Adoption, Adaptation, Appropriation, and Invention* (Sandholtz, et. al., 1997).

Two researchers from George State University, Diaz and Atkinson (2001), found that experiences in the developmental stages of *Survival, Adjustment*, and *Maturity* of novice teachers are similar to teachers' experiences in the technology integration stages of *Entry, Adaptation,* and *Invention*. These researchers point out that the growth process by which a teacher adapts to the integration of technology and passes from novice technology user to expert technology integrator involves changes in themselves and in their perspectives. Table 1 below outlines the stages and the characteristics of the changes, or the transformations, that occur when adults progress from some new ideas to a changed state of functioning.

Table 1: STAGES OF TRANSFORMATION

| | |
|---|---|
| ENTRY/SURVIVAL/ NOVICE:<br>Limited knowledge; problems managing | APPROPRIATION:<br>Repertoire of teaching and tech integration strategies; more confident |
| ADOPTION:<br>Critically assess assumptions about teaching and learning; Explore options for new roles | INVENTION/MATURITY/EXPERT TECHNOLOGY INTEGRATOR:<br>Good command of strategies and classroom management |
| ADAPTATION/ADJUSTMENT/TECH USER:<br>Shift towards student-centered classrooms, learning with technology, in a rich-learning environment | |

Dr. Kathleen King, Director of the Fordham University's Regional Instructional Technology Program also provides us with an analysis of the developmental stages of transformation after reviewing an extensive amount of research on this major thesis. King (2002) categorized the teachers' Journey of Transformation as follows: *Fear and Uncertainty, Testing and Exploration, New Perspectives, and Affirming and Connecting*. A more complete description of the four stages in the journey of transformation is found in Table 2.

Table 2: JOURNEY OF TRANSFORMATION

| | |
|---|---|
| FEAR AND UNCERTAINTY:<br>Hesitant, Fearful, Uncertain,<br>Embarrassed, Needs Nurturing | NEW PERSPECTIVES:<br>New Vision, New Perspective of Teaching,<br>New Connections, New Strategies |
| TESTING AND EXPLORATION:<br>Beginning Confidence, Testing,<br>Exploring, Guidance, Challenges | AFFIRMING AND CONNECTING:<br>Affirming, Connecting Technology with<br>Education, Connecting Learning Experiences |

## BEST TEACHING PRACTICES

After a comprehensive study by Diaz and Atkinson (2001) that included observations and discussions with teachers who infuse technology into their instructional practices, a general conclusion emerged that best teaching practices and best technology integration practices go hand-in-hand. The basis of their beliefs is that best practices have less to do with the pizzazz of a Power Point presentation or graphics whizzing onto a web page and more to do with the methods used for teaching. They described lesson plans of a teacher exhibiting best practices as those that have: multidisciplinary units situated in real-life learning, objectives first with technology as an extension of the objectives, (objectives "drive" the technology), collaborative between all parties, teachers' and students' as both experts and learners, scaffolding, or mind tools, for better comprehension, and a variety of tech tools.

Effective integration of technology has very little to do with technology itself and everything to do with teaching (Dias & Atkinson, 2001). The best teaching with technology practices as referred to in this study is outlined in Table 3 below.

Table 3: BEST TEACHING PRACTICES

| |
|---|
| Real-Life Learning Situations |
| Technology extends Objectives |
| Flexible Roles for Everyone |
| Collaboration of all Participants |
| Scaffolding for Understanding |
| Variety of tools:<br>*word processors *graphics *Internet *digital cameras *scanners |

EFFECTIVE LEARNING COMMUNITIES

Alan November, recognized internationally as a leader in education technology, stressed the need for a pedagogical shift towards *student-centered* classrooms where students work with technology in a rich-learning environment. He believes that the focus of technology training has to shift from how teachers acquire technical skills to how students learn with technology. Schools should not be too focused on training teachers to use a tool without a *clear vision* of how to transform learning for our students. We have got to focus on the instructional delivery tools more than the productivity tools and put those tools in the hands of the students.

To create a scenario that puts students into a more independent and active role in learning, changes must be made in the previous traditional *sage on the stage* format of teaching. In order for teachers to learn how to become the *guide on the side* there is a need to establish more modern and futuristic instructional practices. Therefore, while embracing technology,

teachers also need to know how to enrich learning opportunities for their students that explore new approaches. (November, n.d.)

Effective learning communities offer members opportunities to: expand both the individual's and the group's knowledge, participate in decision-making, take risks without fear of failure, develop expertise, experience a variety of activities, and work on interdependent tasks with others. Teachers build a *community of learners* when everyone is involved in activities together with a shared understanding about what they are doing (Lave, J., & Wenger, E., 1991).

The characteristics of an effective learning community are outlined in Table 4 below.

Table 4: EFFECTIVE LEARNING COMMUNITIES

| Knowledge Expansion |
| --- |
| Decision-Making |
| Taking Risks |
| Develop Expertise |
| Task Interdependence with others in a Variety of Activities |

Classrooms can be organized into *communities of learning* with students, teachers, and community members all playing vital roles in directing the course of education. Dr. Margaret Riel (1998) discovered that as a result of better access to resources, students can become experts on different topics. They can share their expertise by creating resources for others' learning, using today's technological production tools. These tools are now making a difference in classrooms and are helping students to make connections both inside and outside of classrooms. Experts of all ages can now become a part of the resources for learning. This discovery is

similar to the one made by Dias & Atkinson (200l) as one of the facets of Best Teaching Plans, flexible roles, where teachers and students are both experts and learners.

Powerful examples of communities of learners can be seen in the library of websites created by students, assisted by teachers, as part of the ThinkQuest contest. Students from around the world have been forming partnerships and creating educational environments for their peers since 1996. This year marks the tenth anniversary of this successful group, sponsored by the Oracle Education Foundation.

## TECHNOLOGY SKILL DEVELOPMENT

Little progress has been made addressing inadequate preparation of educators to put new technology tools to work. You could have everything you need in place, such as, the technology equipment and the availability of professional resources; however, if you do not change educator's attitudes and extend their tech-related capabilities, there will be no transformation in education (Toci & Peck, 1998). A systems approach to the design of professional development programming can result in a set of resources that encourages long-term involvement and a shift in beliefs that is a necessary prerequisite for meaningful reform.

It might be best to focus the transformation on the students rather than the teachers as mentioned by November (n.d.). Perhaps we should let the students get in there and "get their hands dirty" so to speak with the equipment, and in this way the teachers would see first hand the positive results on various levels of learning, and be encouraged to go to higher levels to achieve educational goals.

Toci and Peck (1998) agree that teachers would buy into school reform and change what they were doing in their classrooms, if they were more certain of the relevancy to their students' success. Once convinced of its value, they believed that teachers would incorporate the products

and strategies for technology skill development. They realized that they could succeed only by developing and distributing products and services that caused the teachers to want to engage in professional development that lead to quick success, while teaching topics of importance to them and their students. Therefore, if teachers did not know how to use technologies or what to do with them to improve teaching and learning in their subjects, the investments in equipment, networking, and software would be lost. Likewise, the investments in professional development would also be lost if teachers were unwilling to use these tools.

In order to implement these changes successfully, the objectives that Toci and Peck (1998) configured were two-fold. They had to develop teachers' willingness and improve teachers' ability. After all, what good is willingness without ability? That only produces people who try, but fail. And what good is ability without willingness? That only produces people who could achieve, but do not. They needed teachers who were risk takers, hard workers, and reformers.

Improve Ability

Ability is achieved through access and support. Powerful contributors towards increasing ability are access to learning experiences both at work and at home, (such as, workshops, courses, on-line tutorials, instructional videos, and books) and another aspect in increasing ability is support when teachers needed quick answers as they wrestle with technological problems.

Develop Willingness

In consideration of the teachers' workload, Toci and Peck (1998) appealed to the teachers' sense of time. By providing relevant and worthwhile lessons that created positive

results in their students' active learning, these "quick successes" helped increase teachers' willingness.

The creation of resources by Toci and Peck (1998) that led to the effective use of learning technologies in schools included twelve strategies and five products, such as, CD-Rom and Online Tutorials, software tools of a collection of shareware, case studies of teachers using technologies, quick success classroom activity lesson plans spanning all subjects and grade levels, on-line conversations connecting teachers with each other, on-line projects for students and teachers, and a learning opportunities database. Table 5 outlines the strategies and products that were the solution Toci and Peck (1998) found to successfully address the complex problem of a comprehensive professional development plan and to accomplish an effective usage of technology in the classroom.

Table 5: TECHNOLOGY SKILL DEVELOPMENT

| |
|---|
| Online Tutorials, Conversations, and Projects |
| Software Tools of a Collection of Shareware |
| Teacher Case Studies of<br>Classroom Activity Lesson Plans |
| Learning Opportunities Database |

## PROFESSIONAL COMPETENCY PLANS

In order to gauge the progress and gain insights as to whether or not technology is being used effectively as a teaching and learning tool, the Milken Exchange provided a discrepancy analysis model. This is a quick assessment tool that teachers could use to evaluate the current state of their own practice. And, this could be used by administrators to assist in focusing on relevant topics for evaluating the teachers' professional competency with technology, such as,

their fluency with contemporary technology, technology's impact on a particular curriculum, usage of communication networks in their practice, and collaborative classroom management, (Milken, et. al., n.d.).

In the Miami-Dade County Public Schools, the Milken Foundation, the Florida Educational Technology Corporation and the North Central Regional Educational Laboratory conducted an even more in-depth study collected through site visits, interviews and surveys. The professional development strategies outlined were a part of the Seven Dimensions for Gauging Progress and Professional Competency and fall under Dimension 3. This particular dimension focused on the questions: *Are educators in Miami Dade Public Schools fluent with technology? Do they effectively use technology to the learning advantage of their students?* It was discovered that most teachers knew how to use technology, but they did not yet know how to use it effectively to advance their students' learning.

Supporting evidence in the Milken Exchange study (1999) suggested that teachers would be best able to maximize their professional development when it is coordinated with the availability of classroom technical resources. This is a similar result to the systems approach of Toci and Peck (1998) about teachers having access to equipment. In conjunction to this availability, the need for on-site support resurfaced with evidence suggesting that support for technology use throughout the curriculum would increase the frequency with which teachers could use technology in core academic areas. Therefore, it appears that two research studies found access and support to be the two key features that need to be in place for teachers to be willing and able to incorporate educational technology into their classrooms.

The Milken study (1999) also discovered the need to have classes available that covered not only software applications and computer literacy, but more importantly, classes that focused

on the actual integration of technology into the curriculum. Specifically, they realized that emphasis on the professional growth that went beyond training and focused on student learning was a more ideal situation because this allowed for classroom teachers and curriculum specialists to learn as they worked with their students. Building-based methods that focused on the learning needs of their particular learners were particularly beneficial. These methods enabled teachers to grow in their professional practice by applying what they learned to their own classroom, interact with colleagues about their experiences, and reflect on the linkage between theory and practice.

The Milken report (1999) is consistent with other findings regarding the need to put the content *first* and a technology connection to the content *second.* Once again this procedure rings true from Dias and Atkinson (2001) as one of the *best practices* to use by teachers who integrate technology. They also discovered that the focus should be on the objectives *first* and later decide *when* and *if* to use technology to meet these objectives.

Opportunities for teachers to plan for the use of technology in the classroom were soon discovered to be limited to times outside of the school day. The Milken study (1999) found that there is a need to find alternative forms of professional development to help teachers successfully and seamlessly integrate technology into the curriculum. A school principal was mentioned who helped to overcome this barrier by the arrangement of planning time that maximized collaborative efforts. For example, by allowing each grade level to meet for one and half-hours twice a week to plan, everyone on the same grade level had the same lesson plans and these lessons were taped and shared.

Table 6 highlights the key factors of the Professional Competency Plans that were found to be necessary prerequisites toward both the achievement of fluency with technology and the

efficient use of technology as per the questions asked in Dimension 3 of the Seven Dimensions for Gauging Progress and Professional Competency (Milken, n.d.).

Table 6: PROFESSIONAL COMPETENCY PLANS

| |
|---|
| Maximize professional development by coordinating with the availability of classroom technical resources |
| Establish planning time to maximize collaborative efforts |
| Utilize building-based methods that focus on the learning needs of their particular learners |
| Place the content *first* and a technology connection to the content *second* |
| Conduct grade-level classes that focus on the actual integration of technology into the curriculum |

ENVIRONMENT FOR CHANGE

The most common thread that revealed itself throughout these research studies as the one necessary ingredient for effective professional development was collaborative effort. In Dr. Cathy Miles Grant's extensive study (1996), schools across the United States were analyzed, and it was discovered that collaboration, and some other surrounding factors, such as, collegiality and a new school culture, must also be in place in order for the delivery and usage of professional development to be successful. This study is similar to the beliefs of Dias and Atkinson (2001) regarding the necessary support for teachers as they encounter challenges of putting into practice their evolving understandings about technology use to support inquiry-based learning. Grant also includes university partnerships as one of the collaborative ventures that would be beneficial towards acquiring new and advanced understandings of content and resources for pedagogical practice. A practice such as this is taking place in one of the boroughs in New York, the Bronx,

between Region 2 and Fordham University's Regional Educational Technology Center, fondly known among all of its participants as R2DII. The aim of this program is the integration of instructional technology into classroom teaching and learning with the primary goals of raising student achievement levels (RETC). Therefore, the key question to address when a school begins to implement a tech-based professional development plan is: "How can technology become the accepted way of learning for *all members* of the school community?"

This question was addressed in "Putting It All Together," a report by McNamara and Grant (1998) which is based on their work with teachers and students at the U.S. Department of Defense Education Activity (DoDEA) school system located in Hanau, Germany. The DoDEA schools serve the children of U.S. military service members and Department of Defense civilian employees throughout the world, and the four schools involved in this initiative, Argonner Elementary, Sportfield Elementary, Hanau Middle School, and Hanau High School, are similar to schools in the United States, both in structure and in the shared emphasis on national standards in the curriculum.

The project began with a shared decision-making model and a goal of bringing all the stakeholders together to make major decisions and recommendations to create an environment for innovation and change. The planning team in Germany was all-inclusive with team members consisting of parents, teachers, the principal, union representatives, a representative from the military base, the school district's assistant superintendent, and computer coordinators. This sharing of decisions is prescribed as the most effective way to support the implementation of technology in the school (Wohlstetter, 1997).

## SUCCESSFUL SCHOOL PARTNERSHIPS

If technology infusion is considered an educational reform, then one should see changes

occurring in four related areas of the school system: *Educational Practice, Professional Culture, Technology Leadership and Management, and School-Community Involvement and Family Participation (Wasser, et. al., 1998).* These dimensions of the Hanau Schools Partnership could be related to the Learning Technology Action Research Process (LTARP) from Dr. Harvey Kaye (1999) which appears to be based on the Triangle of Learning theory of Theodore Sizer, a leading educational reformer in the United States and founder of the Coalition of Essential Schools (Nowakowski, et. al, 1995). The Triangle of Learning specifically involves the relationships between the Teacher, Student, and Subject Matter plus the structural changes schools must make to improve and facilitate that triangular-symbolized community of relationships. The LTARP also utilizes a triangular reference and includes the relationships between the Student and Teacher, School Culture, Teacher and Administration, and the Parents and Others.

A table listing the partnerships that need to be in place in order to achieve successful systemic changes as discovered at the Model Schools Partnership, the Triangle of Learning, and the Learning Technology Action Research Process (LTARP) as outlined in Table 7 below.

Table 7: SUCCESSFUL SCHOOL PARTNERSHIPS

| TRIANGLE OF LEARNING | MODEL SCHOOLS PARTNERSHIP | LTARP |
|---|---|---|
| Student and Teacher | Educational Practice | Student and Teacher |
| Teacher and Teacher | Professional Culture | School Culture |
| Teacher and Administration | Technology Leadership and Management | Teacher and Administration |
| Community | School-community involvement and family | Parents and others |

## METHODOLOGY

In order to conduct a qualitative study about how teachers are integrating technology into their curriculum, a technologically-advanced school site was selected. This site was found in the 2004 NYC Council's Staff Report to the Committee on Technology in Government regarding the status of technology usage in NYC schools. After conducting observations of the teachers and holding conversations with both the teachers and administrators at the site, comparisons will be made to the findings and philosophies of the authorities listed in the Literature Review in this paper as outlined below.

LIST OF LITERATURE REVIEW TABLES:

1) Stages of Transformation delineated by the Apple Classrooms of Tomorrow (1997),
2) Journey of Transformation classified by Dr. Kathleen P. King, (2002),
3) Best Teaching Practices as referred to by Diaz and Atkinson, (2001)
4) Effective Learning Communities written about by Lave and Wenger, (1991),
5) Technology Skills Development provided by Toci and Peck, (1998),
6) Professional Competency Continuum as per the Milken Exchange, (1999),
7) Successful School Partnership Ingredients as advocated by Sizer, (1995), Kaye, (1999); and Wasser, et. al., (1998).

## EXPECTED RESULTS

It took two months to gather all the information in this research report, and an additional month to find a prospective school site to visit, since sadly other teachers in New York do not have access to the "localized web portal to provide high-quality educational resources and to facilitate communication" that Councilwoman Brewer mentioned in Part 1, page 4 of her report, "Expanding Digital Opportunities in NYC Public Schools."

Based upon all the readings and findings on the commonalities among school sites found through research on the Net, the concept of a "community of learners" was the one key factor that teachers need to have in place in order to learn how to use and how to implement technology in their classrooms. A well-functioning community of learners would be one that feels comfortable making inquiries, expressing curiosities, and plans on continuing to make these new discoveries among each other. These kinds of activities will be sought out through conversations with the staff and administration at the site.

This particular school that was selected is located in located within a newly built, technologically advanced structure and is affiliated with a section of a well-respected university that specializes in the advancement of educational technology. Therefore, it is most probable that teachers and students here would have successful partnerships that use educational technology effectively to teach and to learn on a daily basis. That is, on the condition that the teachers and their technical support staff members maintain an atmosphere of mutual and shared respect and consideration, as well as, a deep understanding of the concept of learning for both children and adults (Bransford, et. al., 1999).

Due to the technological advancements and affiliations listed at this site, it is also expected that the teachers would be in the process of utilizing productivity tools and instructional delivery tools successfully on*ly if* there is a collective vision of learning shared by all participants on a daily basis. As Dr. Margaret Riel states *"... new tools alone do not create educational change. The power is not in the tool but in the community that can be brought together and the collective vision that they share for redefining classroom learning"* (Riel, 1990). There is also a book by Michael Schrage (1995) where he points out that "collaborative interaction is essential to success." If these teachers at this school site are working on a mutual goal of enhancing

learning through the incorporation of technology into the curriculum, this should be quite obvious to a visiting observer. The one ingredient that is expected to stand out at the center of endeavors at this school site is the camaraderie of learning with technology.

## ACTUAL RESULTS

The main concern of the research in this report is the methods and procedures of utilizing educational technology by both teachers and students researched across the United States as compared to a specific technologically-advanced school site visited in NYC.

In accordance with the one major factor for successful integration of technology, it was clearly evident upon entry and walk through of the school site that the teachers, students, technology integrators and administrators felt mutual respect and collaborated with each other. In the inner door of the lobby, there pictures of each and every one of the teachers and staff in the building posted in frames on the wall. Across the lobby, in the Administration Office, there were hand-made artifacts such as an African mask with a child's name carved on the reverse side, and there was a collection of children's pictures framed and mounted on the center wall. Situations such as this clearly indicated the consideration the teachers and administrators felt for their students and demonstrated to visitors just how much the administration truly cherishes the teachers and children at this school. If I were asked, "What is one consistent feature about the school site visited?" I would have to say the amount of respect that was shown by all the teachers towards their students. The way they spoke to them, what they said to them, and how they discussed the work with them was truly amazing -- Never a raised voice – only the procurement of an understanding that they were there to learn.

There were several clear examples of classroom teachers and technology support staff working together in various ways toward incorporating technology into their curriculum. During the two-day visitation, the following usage was observed (see Figure 1):

TECHNOLOGY USAGE OBSERVED

- Seventh grade language arts students had written produced and acted out their own scripts for an online movie trailer about one of their books.
- Kindergarten students increased literacy by narrating thought and speech bubbles in on-screen comic strips of scanned photos.
- Third grade students scanned and animated photos using Flash showing various locations of the school.
- Two fifth grade classrooms used Smart Boards for lively discussions from projecting a document to accessing the Internet for further clarification of the subject.
- Third graders worked independently as they programmed their robots during Robotics lab and tested out their input on the floor of the library.

The teachers' involvement in technology at this school site was compared on a scale of proficiency levels from where they are to where they are approaching. This information was gathered by an analysis of the highlights listed within the seven tables accumulated from various authorities in the Literature Review section of this paper, such as, the Stages of Transformation delineated by the APPLE CLASSROOMS OF TOMORROW, (Sandholtz, et. al, 1997). JOURNEY OF TRANSFORMATION classified by K. P. King, (2002), BEST TEACHING PRACTICES as referred to by Diaz and Atkinson, (2001). EFFECTIVE LEARNING COMMUNITIES written about by Lave and Wenger, (1991), TECHNOLOGY SKILLS DEVELOPMENT provided by Toci and Peck, (1998), PROFESSIONAL COMPETENCY PLANS as per the Milken Exchange, and SUCCESSFUL SCHOOL PARTNERSHIPS as advocated by Sizer, (Nowakowski, et. al.1995), Kaye, (1999), and Wasser, et. al., (1998). The progressions of the teachers' usage of technology that was observed at the visited site are outlined below.

STAGES OF PROGRESSION OF EDUCATIONAL TECH USAGE

| Literature Review Tables | Beginning | Approaching |
|---|---|---|
| STAGES OF TRANSFORMATION (ACOT) | Entry Level | Mature Integrator |
| JOURNEY OF TRANSFORMATION (K.P.King) | Exploration | Developing New Teaching Perspectives |
| BEST TEACHING PRACTICES (Dias And Atkinson) | Collaboration of Teachers | Flexible Roles for Students |
| EFFECTIVE LEARNING COMMUNITIES (Lave & Wenger) | Decision Making between Teachers | Task Interdependence among Students |
| TECHNOLOGY SKILL DEVELOPMENT Toci and Peck | Conversations, Tools, and Curriculum | Learning Opportunities Data Base |
| PROFESSIONAL COMPETENCY PLANS (Milken) | Access and Technology Support | Technology Supported Classes |
| MODEL SCHOOL PARTNERSHIPS (Sizer), (Kaye), (Wasser) | Cooperative School Culture | Family Involvement |

DISCUSSION

The first obvious asset and highly recommended feature that was seen at this particular school was their access to equipment, such as, desktop computers, lap top computers, Smart Boards, and LCD projectors. Smart Boards in these classrooms were built into the walls, an LCD projector was strategically placed into the ceiling, and third and fifth graders were seen carrying their own iBooks from class to class.

The most intricate usage of the Smart Board was witnessed in the Science Lab where Ms. A., the multi-grade Science Teacher, was observed using teaching strategies with several grades at various times throughout the day that covered themes across several curriculums – Language Arts, Science, Math, and Technology. At the beginning of the lesson, the children were asked to recall the previous lesson to build and connect to what they had done. This teacher recorded the students' input on the Smart Board and also projected their responses from the previous lesson. Ideally, Ms. A explained that she would show the students a video, slide show or pictures of the "big ideas" of the previous lessons to provide another medium for understanding. The writing of

children's ideas and questions on the Smart Board allowed them to see their ideas in print. As they read along, they supported their reading and their writing development. They were also learning the value of writing their ideas down for reference and articulation and to demonstrate understanding and the changing of ideas. This was followed by cooperatively grouping of three or four, carrying out tasks related to the original brainstorming activity, reflecting and recording on their own sheets, asking questions and discussing their findings with their small groups, and finally sharing these findings with the rest of the class. The results of the experiments were later recorded by the Science Lab teacher for future reference with these students.

There is one main location in the building where students can go and interact freely and purposefully with an iBook and that is in the school's library. Here they have immediate and efficient access to books, videos, and CD-ROMs that correspond to their curriculum because their entire library catalog, pictures of book covers, and book reviews and commentaries are all available on-line.

Overall there were outstanding examples of the incorporation of educational technology at this school site, but during the classroom visitations the students were not seen in a hands-on interplay with the Smart Board, nor were they freely using their own laptops as a reference. However, this school site is basically within the stages of infancy, erected only a few years ago. Considering all the significant goals they have already achieved, it is very likely that the teachers, students and staff will move beyond sprinkling technological activities sparingly and produce even more advanced projects with more interactive participation and independence on the part of their students.

If teachers are the catalysts that make change possible in their classrooms and educational technology is a catalyst of change in classroom practice, then it is the creative use of technology

that can help educators at this site to change this learning landscape. With all of the access to equipment, the number of technical support on-site, and the regular intervals of collaboration of ideas about the curriculum, these classroom teachers are developing naturally and should soon be going beyond the developmental stages in teaching and learning with technology. Incorporating technology to a larger extent within their daily routine should follow naturally at this site having all these advancements and advantages readily available.

The school does have a website and there were two streaming videos exhibited on-line created by one of the in-house Tech Integrators. It seems that in time the teachers and students could easily extend their lessons by publishing their completed projects on their own class websites.

The circle of learners at this site could easily be extended beyond the classroom walls if the teachers and students connected their constructivist model of teaching with the themes and concepts of their integrated curriculum design tool and added a more student-centered, communication tool called "WebQuests" to their repertoire. WebQuests were designed to bring together the most effective instructional practices into one integrated student activity. (March, 1998). This type of activity would enable students to become more actively involved in their lessons by assigning tasks to small groups, to search the Net on designated sites, to compare their findings with their team mates, to pool their resources with the other Internet searchers, and to create a presentation of their new-found knowledge to the entire class.

## RECOMMENDATIONS

In analyzing an overview of the K-7 integrated curriculum of the school site visited, WebQuests were gathered to enhance their units of study. These Quests are applicable to the curriculum of the Kindergarten to 2$^{nd}$, 3$^{rd}$ to 5$^{th}$, and 6$^{th}$ to 7$^{th}$ grades at this school.

K – 2nd Grade WEBQUESTS:

| WEBQUEST TITLES AND ADDRESSES<br>K - 2ND GRADE CURRICULUM | |
|---|---|
| THEMES: My Self, Family, and Community<br>CONCEPTS: Self, Exploration, Nature; Family, Imagination, Cycle; Structure, Custom, Expression | |
| "I Know My Shapes and Colors"<br>http://www.educationworld.com/a_tech/webquest_orig/webquest_orig009.shtml<br>"I Love Books"<br>http://www.sdcoe.k12.ca.us/score/books/bookssg1.html<br>"So You Want to Be a Writer…"<br>http://coe.west.asu.edu/students/lcastiglione/WQ/index.htm<br>"Families"<br>http://www.lfelem.lfc.edu/resources/sstudies/kinder/family.html<br>"Cause They Don't Look Like You"<br>http://coe.west.asu.edu/students/hlynch/ToleranceWebQuest/tolerancewebqst.htm | "First Grade Key Pals"<br>http://projects.edtech.sandi.net/grant/keypals/<br>"World of Chicks"<br>http://coe.west.asu.edu/students/mmyers/WebQuest2000/ChickWQk2/Chickwebquest1.htm<br>"An Insect's Perspective"<br>http://projects.edtech.sandi.net/grant/insects/<br>"The Life Cycle of a Butterfly"<br>http://coe.west.asu.edu/students/rfox/webquest/webquest.html<br>"Bee on a Quest"<br>http://coe.west.asu.edu/students/dpicard/webquest.htm |

K – 2nd Grade WEBQUESTS:

| WEBQUEST TITLES AND ADDRESSES<br>K - 2ND GRADE CURRICULUM | |
|---|---|
| THEMES: My Self, Family, and Community<br>CONCEPTS: Self, Exploration, Nature; Family, Imagination, Cycle; Structure, Custom, Expression | |
| "My Five Senses"<br>http://www.educationworld.com/a_tech/webquest_orig/webquest_orig003.shtml<br>"Animals and Me"<br>http://projects.edtech.sandi.net/brooklyn/animals/<br>"Animal Hide and Seek"<br>http://projects.edtech.sandi.net/brooklyn/camouflage/<br>"Frog Finds His Family"<br>http://warrensburg.k12.mo.us/webquest/frogs/index.htm<br>"Pigs"<br>http://warrensburg.k12.mo.us/webquest/pigs/index.htm | "Koala Quest -- Are they really bears?"<br>http://warrensburg.k12.mo.us/webquest/koalas/index.htm<br>"Marine Life"<br>http://coe.nevada.edu/lbishop/webquest/bishopwebquest.html<br>"Fun with Math Patterns"<br>http://coe.west.asu.edu/students/jkosier/wquest/intro.htm<br>"A2Z Zoo Quest"<br>http://coe.west.asu.edu/students/wduzan/zoo_wq/thezoo_wq1.htm<br>"Community Helpers"<br>http://coe.west.asu.edu/students/lvesely/wquest/task.html |

3rd – 5th Grade WEBQUESTS:

| WEBQUEST TITLES AND ADDRESSES<br>3rd – 5th GRADE CURRICULUM | |
|---|---|
| THEMES: My City, Country, Society<br>CONCEPTS: Experience, Movement, Change; Exploration, Nation, Justice; Culture, Reality, Communication | |
| "An Adventure to the New World"<br>http://www.kn.sbc.com/wired/fil/pages/weblandhomr.html<br>"Homeward Bound WebQuest"<br>http://warrensburg.k12.mo.us/webquest/environments/index.htm<br>"The Monarch Butterfly WebQuest"<br>http://www.my-ecoach.com/online/teacherguide.php?projectid=5146<br>"Around the World"<br>http://warrensburg.k12.mo.us/webquest/continents/index.htm<br>"Planet WebQuest"<br>http://schools.sbe.saskatoon.sk.ca/Victo/projects/Grassroots/Planet%20WebQuest/WebQuest2.html | "What's it like where they live?"<br>http://warrensburg.k12.mo.us/webquest/whatsit<br>"Animal Life Cycles"<br>http://warrensburg.k12.mo.us/webquest/cycles/<br>"The Spineless WebQuest"<br>http://warrensburg.k12.mo.us/webquest/inverts/<br>"Eleanor Roosevelt"<br>http://ww2.sjc.edu/faculty_pages/rchatel/webqu |

6th – 7th Grade WEBQUESTS:

| WEBQUEST TITLES AND ADDRESSES<br>6th – 7th GRADE CURRICULUM | |
|---|---|
| THEMES: Culture, Civilization, Continuity, Change<br>CONCEPTS: Civilization, Analysis, Memory; Society, Knowledge, Synthesis | |
| "Where in the World Are We From? A Search of the World's Biomes"<br>http://warrensburg.k12.mo.us/webquest/biomes/index.htm<br>"Life in Shakespeare's Time"<br>http://warrensburg.k12.mo.us/webquest/shakespeare/<br>"Make a Difference! The Search for Truth -- The Search for Youth"<br>http://warrensburg.k12.mo.us/webquest/makeadiff/<br>"Natural Disasters"<br>http://warrensburg.k12.mo.us/webquest/disasters/ | "You have been selected to rewrite history the Salem Witch Trials"<br>http://www.geocities.com/salemwitches_ca/<br>"Ellis Island WebQuest"<br>http://www.ardecol.ac-grenoble.fr/english/ellisislandwebquest.htm<br>"The Info-Quest!"<br>http://www.whps.org/school/kingphilip/ITL/index.htm<br>"American Dreams…through the decades"<br>http://learning.loc.gov/learn/lessons/97/dream/index.html |

## CONCLUSIONS

According to Apple Teachers of Tomorrow, STAGES OF TRANSFORMATION, (Sandholtz, et. al, 1997), the teachers at the visited sight exhibited a wide range of the developmental stages toward integrating technology into their curriculum. Four teachers seen could be placed along the Entry level of limited knowledge with technology and problems with

its management, four other teachers would fit within the Adoption level where they were critically assessing their assumptions about teaching and learning and exploring options for new roles. Two Science, one Math, and three Tech Integrators would register on the Adaptation level which is a shift towards student-centered classrooms that learn with technology in a rich-learning environment, and one of the Science teachers could even be placed in the Appropriation column which means she was more confident and experienced and demonstrated a repertoire of teaching and technology integration strategies.

In comparison to the JOURNEY OF TRANSFORMATION formulated by Dr. King, (2002) these teachers could be described as ranging from hesitating and uncertain, to some confidence and exploring, to attempting new strategies, and finally, connecting learning experiences with technology.

One of the Science Lab teachers also exhibited the BEST TEACHING STRATEGIES described by Dias and Atkinson, (2001), such as, using real-life situations to teach, establishing an environment of flexible roles for everyone, arranging for collaboration of all participants, and scaffolding for understanding and all of these roles were demonstrated using technology. There was a clear indication that this teacher was adhering to Alan November word's (n.d.) when he stresses the need towards a pedagogical shift towards student-centered classrooms that include working with technology in a rich-learning environment. More teachers need to follow his advice and follow this teacher's example by practicing these new approaches to teaching and switching their positions from "sage on the stage" to "guide on the side."

If this school or any school is to maintain the characteristics of EFFECTIVE LEARNING COMMUNITIES and develop expertise as advocated by Lave and Wenger, (1991), then teachers and administrators need to expand their knowledge in technology usage, share in the decision

making about appropriate teaching with technology tools, take risks and try various features along with the students.

Although the teachers at the site visited have everything they need in place, such as the technology equipment and the professional resources as advocated as necessary for educational reform by Toci and Peck (1998), the usage of technology was not seen as frequently as would be expected. They seem to need more encouragement on the part of the administration and more instruction on the part of the Tech Integrators for TECHNOLOGY SKILL DEVELOPMENT to take place on a more consistent basis. Perhaps, as November (n.d.) also suggests, it might be best to focus the transformation on the students. In other words, let the students get in there and get their hands dirty so to speak with their technology equipment. Another solution found to successfully address the complex problems of professional development was the establishment of a Learning Opportunities Database for the teachers. With this in place, teachers would have quick success classroom activity lesson plans spanning all subjects and grade levels, such as, WebQuests that tie into their integrated themes and concepts.

The in-depth study on PROFESSIONAL COMPETENCY PLANS conducted by the Miami-Dade County Public Schools, the Milken Foundation, the Florida Educational Tech Corporation, and the North Central Regional Educational Laboratory (Milken, 1999), focused on a question that seems relevant even within a school as technologically-advanced as this particular school site. The question asked during this study and still relevant today is this: "Are teachers effectively using technology to the learning advantage of their students?" The Milken study emphasized the need to have workshops that actually explained how to integrate technology into the curriculum. One way to do this would be to examine a selection of WebQuests that would be applicable to their curriculum, asking the Technology Integrators to model how to navigate

through one, and follow this up by serving as coaches while the teachers attempt to carry out the lessons in their classrooms. Since grade level meetings already take place on a regular basis at this site, it should be natural to allow some time to focus on the actual integration of technology into their curriculum.

Once again, the most common thread that revealed itself throughout the research studies as the one necessary ingredient for effective professional development was collaborative effort. And the one clearly evident feature of this school site was that the teachers, students, technology integrators and administrators collaborated with each other. Therefore, the one key question that they need to address at their next meeting is: "How can technology become the accepted way of learning for all members of our community on a daily basis?"

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REFLECTIONS

REFLECTION 1: ENTERED THE RETC PROGRAM AT FORDHAM UNIVERSITY

I took up the challenge made by our 7th U.S. Secretary of Education, Rod Paige to "Dream how technology can not only *improve education* but also *transform* what we think of as education" by joining the RETC Program with Fordham University in the summer of 2005. The aim of the program was to raise student achievement levels by integrating technology into our teaching. It was my responsibility to introduce instructional technology to Austin, Besa, Brian, Cristina, Hannah, Jacquelyn, Christie, Daniel, Christyann, Stephanie, Hysen, Fabian, a group of first graders. What a challenge! The mission was successfully accomplished through lessons on the web called WebQuests. With this educational and communication tool – we both learned a great deal of interesting and useful information about the science and social studies content areas and also became more confident and comfortable with using the computer to research, to cut and paste, to print, and to graphically represent our results to other teachers and students.

REFLECTION 2: ENTERED THE SCHOOL AT COLUMBIA UNIVERSITY (2/06)

I visited the School at Columbia University with a "tall order" given to R2DII teachers by Dr. Kathleen P. King and the RETC Professional Developers to find the answer to 3 questions….

1. HOW DO WE BUILD RESEARCH AND CRITICAL THINKING SKILLS USING TECHNOLOGY?
2. HOW DO WE DEVELOP UNDERSTANDING OF THE ISSUES RELATED TO TECHNOLOGY AND SOCIAL RESPONSIBILITY WITH YOUNG PEOPLE AS THEY MATURE?
3. HOW DO WE USE TECHNOLOGY ACROSS, AND WITHIN, THE CURRICULUM TO LEARN AND EXTEND THE STUDENTS' UNDERSTANDING AND APPLICATION OF FACTS AND CONCEPTS?

As per Dr. Kathleen P. King (2006), "This is a tall order, but it is what we really strive for in the PD that we do with RETC. It is our model of integrating tech across the curriculum."

ANSWERS TO THESE QUESTIONS SEEN AT THE SCHOOL SITE VISITED:

- One Science Lab cluster demonstrated these higher-level teaching strategies.

I saw more teaching and learning going on in this classroom during the class timeframe than I've seen during most of my 18 year career!

- One 5th Grade teacher taught cultural awareness through the Internet.

This teacher previously located visual examples of Chinese seals and had the children examine these for the specific details inherent in each one, then helped the students make comparisons to other seals they learned about and made themselves.

- One Educational Technologist integrated language arts with comic making software with Kindergarteners.

This tech support person not only patiently modeled the technology repeatedly, but she also encouraged the students to think about what was occurring in each picture, and assisted these two students from a "guide from the side" viewpoint whenever they asked how to spell the words they wanted for each of the frames they completed.

It would be worthwhile to note that it was a pleasure talking with each of these three teachers. They were very open, honest, courteous, and respectful to me, a visitor, just like they were with their own students.

REFLECTION #3: COMPLETED MY ANALYSIS OF THE SITE VISITED (3/06)

I realize that I only visited the school site two times, but these were not in consecutive order; there was an entire week's lapse, and both times I was given a list of people to see. I'm not sure if these people were selected or volunteered, but I didn't find technology going on in most of these designations either time I visited. The second time I even specified before I

arrived that I needed to "walk and talk tech" while I was there, and still I saw little or nothing going on during that visit either.

I learned a lot from the Action Research I gathered on what other researchers found to be the successful ingredients to integrating technology in the curriculum. Several of the qualities these researchers stated as necessary to be in place, such as, access to equipment and technical support resources, were available at this technologically-advanced location, and yet I only saw and heard a few examples. Outstanding, yes, like 3rd graders programming robots, but even this activity did not seem to involve much planning on the part of the teachers or critical thinking on the part of the students. It especially bother me that I did not see the students being allowed to interact with the Smart Board or to freely access the Internet for elaboration of the lesson on their own laptops. One classroom teacher invited me in to "see "an integrated technology lesson" but all I witnessed was his projection of a typed piece of paper on a Smart Board! He used this expensive equipment as a projector, and it wasn't even something worth seeing visually nor was it academically enlightening. A lot more hands-on activities and in-depth learning with technology in an integrated curriculum took place with the seven years at my own school.

I also learned a lot just by reading an article in Power to Learn, (CSC Holdings, Inc. 2006), an e-service by Cable Television, written by Dr. Jim Lengel, the Dean of Faculty at the Benjamin Franklin Institute of Technology in Boston. In this article, Dr. Jim Lengel outlined the findings of the graduate students enrolled in his online Technology in Education course at Boston College. The graduate students completed a research project related to the stages of development with technology that focused on where teachers were in their use of technology and what they needed next to move forward. These researchers, most of them seasoned school principals and administrators, surveyed 100 teachers and many discussed their development with

the researcher. These teachers were mostly in Massachusetts schools, with 43% elementary, 57% secondary levels, large and small schools, urban and rural communities, and held various subject area specialties.

TEACHER DEVELOPMENTAL STAGES

| STAGE | | % |
|---|---|---|
| 1) | Entry | 2 |
| **2)** | **Adoption** | **38** |
| 3) | Adaptation | 28 |
| 4) | Appropriation | 20 |
| 5) | Innovation | 12 |

Of the five developmental stages, most of the teachers described themselves in Stages 2 and 3, with a plurality at the 2nd Stage. At this stage, teachers stated the basic technical tools, (word processor, email, and the Internet), were applied to their teaching of traditional subjects. They agreed that technology is here to stay and important for their students to use, and that it was being used when it works and under their control.

Looking more closely into how they are adopting technology, they found was that they don't use it consistently for teaching and learning. Some examples of this lack of usage are listed below:

- most (51%) reported that they assign computer work only occasionally in their classes
- 22% described most of their assignments as based on paper-and-pencil work, with technology as incidental to traditional teaching methods
- only 7% used electronic or web-based communication regularly in their professional tasks of teaching and learning.
- only 10% involve their students in creating media-rich presentations.
- word-processing and other productivity tools was encouraged by more than 60% of the teachers, though not employed regularly for innovative curriculum applications
- 1 out of 5 teachers have yet to take the leap into Internet research, while 60% allow it as a complement to print-based referencing
- only a small proportion used WebQuests, and
- only 4% involve their students in their own online publishing.

In summary, Dr. Lengel reported that even though teachers in this research study were moving forward through the developmental stages, their actual application of specific technologies had not penetrated the day-to-day work of the classroom for most of them.

According to these researchers, teachers need three things to move up to their next stage: reliable access to technology in class and solid professional development opportunities. And what they want to learn in these sessions is not so much the operation of the computer, but ideas for integrating technology into the regular subject areas, use of multimedia tools, and online research.

OBSTACLES TO TEACHER DEVELOPMENT

| **Obstacle** | **%** |
|---|---|
| Not enough computers for my students to use | 22 |
| Lack of effective professional development opportunities | 19 |
| **Lack of ideas for lesson plans and integration strategies** | **11** |
| Computers that are inadequate to our educational tasks | 10 |
| Lack of administrative encouragement and support | 4 |
| Lack of local expertise and technical support | 4 |
| An inflexible schedule that makes it difficult to use technology | 3 |
| Poor or unreliable network connections | 2 |
| Software that is not appropriate to my students' needs | 1 |

What's keeping them back?

When asked to identify a major obstacle to their moving forward with technology, the most popular choices concerned computer access and professional development. Other possible obstacles, such as, network connections, inflexible schedules, or lack of local support did not seem to be holding back this group of teachers.

In short, more computers in the classroom and new ideas for using them for learning seemed to be what they needed to move forward.

This is an update to the research I located and shows that the situation has not changed in almost a decade. It appears that most teachers are within the "Adoption" level of development, and they are not using technology on a daily basis. In order to move forward, they still need the same things: access to equipment and professional development, specifically, development of ideas that incorporate technology into their subject areas.

Then the question foremost in my mind after visiting a technologically-advanced school site is: Why aren't these teachers incorporating technology on a daily basis into their curriculum?

http://www.powertolearn.com/articles/teaching_with_technology/article.shtml?18