During the 1994-1995 School Year, Horace Mann began to implement Synthesis, a three-year technology pilot program to redefine and restructure technology use and education. The program was developed to better serve the students and faculty, and in response to evolving needs and the increased sophistication and availability of educational technology.

Synthesis has three major components: Mastery Assessment, Instructional Workshops, and Technology Integration.

Synthesis Elements

Mastery Assessment

The computer graduation requirement, which until 1994 had been one full-year, half-credit course, has been redefined. Each student in every grade from the Class of 1997 and later is now required to successfully complete a demonstration of age-appropriate computer skills every year. This individualized approach to assessment enables students with a strong foundation of skills to demonstrate their fluency, and helps us direct specifically targeted instruction to students with less experience. This provides a framework for each student to learn those skills which he or she has not yet acquired or add new skills to an already broad base.

At the early levels, the Mastery Assessment includes accurate keyboarding, disk, directory and file management, basic word processing, electronic mail, network access and other related skills. Each successive Mastery demonstrates growing fluency in these basic skills and adds more advanced skills in word processing, graphics, spreadsheet, database, telecommunications, peripherals, and any new software or technological developments that would offer significant benefits to a student at that grade level.

We encourage students to learn and practice the Mastery skills through practical computer use at home or in school. Computer skills acquired in pursuit of a relevant and meaningful goal are learned more thoroughly and provide a better foundation for more advanced skills.

Every student receives a copy of the Mastery as part of a complete packet of instructional material during the first day of Computer Lab class.

Instructional Workshops

The computer courses offered over the last few years have included a wide variety of applications, topics and experiences. An even wider variety is now available in the form of specific, topic-oriented workshops. Each workshop is designed to teach a single specific topic, and will offer a combination of instruction and hands-on practice.

These workshops are available to students and to faculty. Teachers and students cooperate with each other and learn new skills together. This is a flexible and adaptable system, in which schedules and topics can be immediately modified or constructed to meet a variety of institutional and individual needs.

We continue to offer all four of our full-year computer programming elective courses: Program Design (introductory), Advanced Programming, Programming in C (both intermediate) and Advanced Placement Computer Science.

Technology Integration

We chose sixteen pilot teachers from seven academic departments to participate in the cornerstone component of the Synthesis program. In 1994-1995, eight of these technology pilot teachers attended the National Educational Computing Conference and in cooperation with technology specialists from the Computer Department faculty, developed technology-based activities for use in their classes.

The second group of eight teachers attended NECC in June 1995. Working with the first group of pilot teachers and the technology specialists, these teachers are currently developing and implementing additional activities for their classes. We chose sixteen more volunteer teachers for the program in 1996. By the end of the three-year program, at least 32 teachers will be offering technology-based activities within the curriculum. We expect that many more teachers will actually be involved, both directly and on a smaller scale.

Each activity is evaluated by students, the pilot teacher, and the cooperating technology specialist. This comprehensive and ongoing assessment has helped improve and refine the activities for the future.

In Conclusion

We are very excited about this innovative program which provides a significantly broader and more vital experience for students, a more fully trained and technologically-aware faculty, greater responsiveness to a variety of educational and institutional needs, and a significant opportunity to diversify the types of learning activities that occur throughout the school.

With Synthesis, Horace Mann is again demonstrating its strong commitment to providing comprehensive offerings in computers and educational technology. This program is bringing us even closer to our goal of incorporating the most innovative and effective applications of educational technology in any school in the nation.

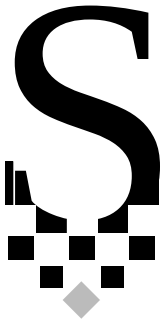
The Birth of Synthesis March 1994

General concept of multi-part technology plan is devised by Adam Kemmer.

The following steps took place within a twenty-four hour period:

- Computer Department members discuss the concept of a large-scale change in computer education and technology integration, considering implementation only peripherally. (12:00–1:00 PM)
- Draft of proposal for plan presented verbally to Head of School and Acting Head of Upper Division. They approve the concept and recommend that it be reviewed by the Committee on Instruction. (1:00–2:00 PM)
- Proposal presented verbally to Chairman of Committee on Instruction. Agenda for the following day's meeting is cleared and this proposal becomes the topic of discussion. (2:00–2:30 PM)
- Formal proposal is completed overnight and presented at the morning meeting. After 45 minutes of discussion, the proposal is approved by the Committee. (8:30–9:15 AM)
- Head of School formally approves the proposal and authorizes immediate implementation. (11:00 AM)

Letter sent to all faculty in grades 7–12 describing program and offering 8 openings. 27 faculty respond, requesting to be included in the program.



Program Timeline • 1994-1996

Combine Together

April 1994

8 faculty members are selected as technology pilot teachers, representing every academic department and encompassing classes in grades 7–10.

7 of 8 pilot teachers and 4 computer teachers/technology specialists register to attend NECC'95 in Boston.

Computer teachers meet regularly to develop Mastery program and Instructional Workshops.

Director of Scheduling agrees to schedule every student in grades 7-10 for a one-period-per-week Computer Mastery Workshop. Projection is for each workshop to last six to eight weeks.

The student newspaper runs a story describing the Synthesis program and an editorial commending the computer department for making appropriate changes in curriculum to keep pace with technological progress and changes in student ability.

May 1994

Pilot teachers meet with technology specialists to discuss the conference.

Hotel and travel arrangements are finalized.

Computer teachers continue development of Mastery Workshops and related materials.

June 1994

All participants attend NECC "94 in Boston.

Pilot teachers begin developing technology-based activities for the 1994-1995 school year.

July & August 1994

Discussions continue between pilot teachers and computer teachers.

Some equipment and software is ordered for planned activities.

September 1994

Before classes begin, computer teachers plan the full year's schedule of Mastery Workshops. They are scheduled in two parts: 7th and 8th grade workshops will begin in early October, 9th and 10th grade workshops will begin in January.

The computer teachers begin creating a textbook for the Mastery Workshops.

Technology-based activities begin on the first day of classes with geography units for American History and World History classes

Computers, peripherals and software are ordered for more activities. Each pilot teacher orders a computer and software for his/her classroom. Other software is ordered in quantity for the computer labs to meet the needs of planned activities for entire classes.

The first edition of the Computer Mastery Workshop textbook is completed and duplicated for each 7th and 8th grade student.

October 1994

Mastery Workshops begin for 7th and 8th graders. Every student receives a Mastery Guidebook

Development of technology-based activities continues in every department.

New activities begin each week. Some are demonstration based, in which the teacher uses the computer to demonstrate, present or simulate a concept. Others are exploratory, in which students use computers or other technology to discover or further explore a concept individually or in groups. Still others are creative, in which students use computers to create drawings, journals, materials to be used outside the class and multimedia presentations of their own.

November 1994

Each pilot teacher continues development and implementation collaboratively with a computer teacher.

The computer teachers begin developing the second edition of the Mastery Workshop Guidebook.

Seventh and Eight grade workshops are coming to a close. All students in these grades take the Mastery for the first time. Appoximately 20% complete the Mastery perfectly on the first attempt. Approximately half of the remaining students complete it on the second attempt.

December 1994

40% of the 7th and 8th grade students have not yet completed the Mastery successfully. They continue to retake it each week, with one-on-one or small group instruction in between. By the end of December, all but a few 7th and 8th grade students have successfully completed the Mastery.

The second edition of the Mastery Workshop Guidebook is completed for 9th and 10th grade students.

January 1995

9th and 10th grade students begin taking Mastery

Workshops

Development and implementation of technology activities continues.

February1995

9th and 10th grade students continue in Mastery Workshops

Development and implementation of technology activities continues.

March1995

9th and 10th grade students take the Mastery for the first time. Success rate parallels that of 7th and 8th graders, and most students have completed the Mastery successfully by the middle of the month.

Development and implementation of technology activities continues.

April 1995

Synthesis pilot teachers and computers teachers meet to review the program to date, and to discuss plans for the following year.

A letter is distributed to all faculty not already in the program inviting participation in the second year. Again, there are more responses than there are openings.

Eight more teachers are chosen; they register for NECC '96 and begin discussions with a computer teacher and pilot teachers from the first year. Second-year teachers are encouraged to develop new activities and to draw on the successes of the first year teachers as well.

May 1995

Registration and travel plans are finalized.

June 1995

7 of 8 second-year teachers and 3 of 4 computer teachers attend NECC'95 in Baltimore.

Summer 1995

New activities are developed; first-year activities are refined.

Some equipment and materials are ordered for the fall trimester.

Fall 1995

Sixteen subject teachers are participating in Synthesis. They are creating new activities, refining and reprising successful ones from the first year.

The third edition of the Mastery textbook is completed and renamed *Mastery Guidebook*.

Half of the 7th and 8th grades and all but 20 9th graders begin Mastery Workshops.

Winter 1995

Technology integration activities continue in development and implementation.

Mastery Workshops continue for remaining 7th and 8th graders.

The fourth edition of the Mastery Guidebook is completed.

10th and 11th graders and remaining 9th graders begin Mastery Workshops in February.

Spring 1996

Masteries are complete for all students. Topic workshops (single period classes introducing advanced topics) are scheduled in the Mastery Workshop periods. 10th and 11th graders are required to attend their choice of two of the seven scheduled topic workshops.

A letter is sent to all faculty not already participating in Synthesis inviting them to join the program in the third year. In the final year, sixteen teachers are scheduled to attend NECC '96 in Minneapolis.

Installation of a high-speed (T1) Internet connection to the school is completed.

In accordance with the original proposal, the four computer teachers begin thorough assessment of the Synthesis program to date, and begin to develop a plan for an appropriate continuation of the Synthesis program to begin in the Spring of 1997, when the three-year Synthesis program is scheduled to be complete.

Planning is started for a presentation at NECC '96.

Summer 1996 (and beyond)

The Synthesis teachers expect to focus on the following areas:

- Additional faculty training for technology integration
- Expansion of facilities and connectivity
- Added emphasis on interdisciplinary and interscholastic collaborations
- Expansion of Synthesis into the elementary grades
- Creation of materials that will help other schools implement Synthesis

To Form a Whole

Mastery Assessment/Instructional Workshops

We completed instruction for all 7th and 8th grade students. Their workshops began during the week of October 3. With a few individual exceptions, these students all successfully completed the Level I Computer Mastery by the end of December.

Mastery Workshops for the 9th and 10th grades began on November 28, and continued through December and January. All of these students completed the Level II Mastery by April. Some 11th and 12th grade students who had not previously completed a computer graduation requirement also completed the Level II Mastery. We are revising the Mastery Assessments and workshops to shift their focus slightly while adding additional skills.

Approximately 20 faculty and staff members completed a three-session Mastery Workshop during trimester 1. We offered advanced topic workshops for students, faculty and staff during trimester 3.

Technology Integration

Program Participants

Department	Pilot Teacher
Mathematics	Carolyn Bucci
Health/Guidance	Eleanor Henderson
Visual Arts	Ron Logan
History	Andrew Newcombe
English	Christine Pakkala*
Science	Fran Pearlmutter
Foreign Language	Sonya Rotman
History/English	Duncan Wilson

*unable to attend June conference

All teachers attended the National Educational Computing Conference in Boston, June 1994. Also attending were Lionel Garrison and Rick Somma (Math) and all four members of the Computer Department (Nick Faba, Glenda Guerrero, Adam Kenner and Janet Smith). All participating teachers have significantly increased their fluency and understanding of technology use.

Mathematics

3-D Geometric Mobiles: Students in all 8 sections of Algebra I used ClarisWorks graphics software to create plans for 3-D geometric figures. These were cut from paper, folded and assembled, and combined into hanging mobiles. These mobiles were judged in a contest and displayed in the Library. This project provided an understanding of multi-sided geometric solids and introduced students to 3-D modeling. This also helped prepare them for the Science/Arts Solar House development project and the Visual Arts tile project.

Spreadsheet Test Evaluation: Carolyn has explored developing a spreadsheet database system to give students detailed individual feedback on test performance.

Geometer's Sketchpad in Honors Geometry: Rick Somma began using Geometer's Sketchpad in his Honors Geometry class last year. He has continued to refine his project and develop new computer explorations for all Geometry students. Nancy Seligman and Jeff Wyshner are also participating in the Geometry project this year.

E-mail Journal Writing: Kathryn McQuinn required that Intro and Algebra students submit journal entries via e-mail. Carolyn will require this in trimester 3.

Fraction Quizzer & Polynomial Puzzle: Students in Introduction to Algebra and PreAlgebra tested and evaluated Fraction Quizzing programs written by the Upper School Program Design class. Students also used and evaluated a Factoring Puzzle program written by Computer Department faculty member, Janet Smith.

Health/Guidance

6 sections of Health have used the **Decisions Decisions: Group Problem Solving & Discussion** software which presents topics and creates a non-threatening environment for discussion. Each section has already attended one of three scheduled sessions.

Visual Arts

Modular Tiles Using ClarisWorks: 8th Grade Art classes are creating modular tile presentations using ClarisWorks.

Book Illustration: 8th Grade Drawing & Painting classes are using ClarisWorks painting to illustrate and present a story.

Comparison of Manual and Technical Painting Techniques: 9th Grade Drawing & Painting students are exploring the painting tools and studying the comparison of manual and technological techniques. Individual students are doing independent work using Adobe Illustrator with Ron's guidance.

Photo III Technology Integration: Karen Johnson began using Adobe Photoshop with Photo III students last year.

History

National and International Inspirer: In two sections of 9th Grade World History, students used a geography exploration game, the International Inspirer, to learn details of world geography and international trade. Two sections of 10th Grade American History used the National Inspirer to explore US geography. The Inspirer programs were a great success in both 9th and 10th grade. Students cooperated in groups to navigate around the World (or the US) in search of locations that met certain criteria. Students reacted very positively to these programs, commenting that they enjoyed the unique experience and that they would like to try other similar programs.

Lecture Enhancement with Multimedia: Andrew created two custom interactive slide shows from the World History VideoDisc: one on MesoAmerica (Aztec/Inca) and one on Discoverers. Andrew created three custom interactive slide shows on Slavery, Native Americans and the Great Awakening. Videodiscs have been used as picture libraries to illustrate lectures in all four sections.

American History Multimedia Milestones: Students in two sections of 10th Grade American History are currently working in groups to develop multimedia presentations on women, civil rights and Native Americans. Their presentations will introduce these topics to the entire class.

English

Using ClarisWorks and Pagemaker to layout a Middle School Publication: Christine created Lions In Training, the new Middle School Arts and Literature magazine, using ClarisWorks and PageMaker. Middle School students will create the design and layout for the second edition, which is planned for trimester 3.

Science

Using Chemistry at Work: Fran has integrated the Chemistry at Work videodisc into lessons throughout the trimester. This disc complements the Chemistry at Work textbook series which the students use. Fran's projects have included interactive presentations on crystalline structure, heat reactions, and other topics.

Using Probes and Computers in Chemistry Experiments: Fran has also designed experiments using analog temperature and pH probes. Students conducted experiments using the probes which collect data directly into the computer. They graphed and printed the results using the software that accompanies the probes.

ClarisWorks Spreadsheets and Frequency Charts: Sis Roberts brought 2 9th Grade sections to learn a specific application of spreadsheets for charting the results of an experiment.

Using America Online as a Science Research Tool: Three sections of 7th Grade Science (with Mary Beth Murray-Wilson) are learning to use America Online as a research tool for their independent study projects.

Foreign Language

HyperGlot: Sonya is using HyperGlot Russian language software which includes digitized native voices to speak words and phrases. Russian III students are currently using this software one day per week in their class.

MINITEL: We have opened a subscription to MINITEL, the French online information service. French IV students will be using this service to explore current issues and cultural topics in France. We have also initiated a collaborative project with the University of Paris–Dauphine. A leading professor at the University has been working to develop curriculum projects using technology in French language classrooms. Our students are researching current art exhibitions in Paris and creating a guide which will be made available on MINITEL.

Foundations (7th Grade History/ English)

Grammar Lessons with ClarisWorks: Duncan has used ClarisWorks to record and display grammar lessons and student-created grammar examples.

Early Human Writing Exploration with ClarisWorks: He is also developing an Early Human Writing project where students create and use their own logo graphic language in order to explore the nature and limitations of writing.

Simulation Games: He has experimented with a simulation game in his homeroom that teaches group decision making skills around topics such as the environment and media violence.

Electronic Conferencing About Being Human: Together with another foundations class, Duncan has set up an on-line discussion and exploration of the theme of "Artificial Life- the future of being human." The classes will use the texts of **Frankenstein** and **Do Androids Dream Of Electric Sheep (a.k.a. Blade Runner)** as the starting point for this project.

Mastery Assessment/Instructional Workshops

The Mastery Workshop course for 7th, 8th and 9th grade students began in two sessions during the weeks of October 3 and November 27. By the end of January nearly all students had successfully completed their assigned level of the Mastery.

Level 4 Mastery Workshops for the 10th and 11th grades began on February 5. Most of these students completed the Mastery by March 13. Each student then selected and attended two advanced topic workshops offered throughout the third trimester. The offerings included PageMaker Basics, Internet Exploration, Multimedia Presentation, CD rom Evaluation, Introduction to Programming and Foreign Language Wordprocessing.

The Mastery Guidebook, now 85 pages long in the Fourth Edition, includes all necessary instructional components, workshop descriptions, syllabi, and mastery assessments for levels 1, 2, 3 and 4.

Technology Integration

Program Participants

Department	Pilot Teacher
Mathematics	Pat Hayes
Health/Guidance	Peggy Hartmann
Visual Arts	Kim Do
History	Sandy Richter
English	Patrick Deer
Science	Janet Kraus
Science	Susan Delanty
Foreign Language	David Richards*

*unable to attend June conference

All teachers attended the National Educational Computing Conference in Baltimore, June 1995. Also attending were three members of the Computer Department (Glenda Guerrero, Adam Kenner and Janet Smith). All participating teachers have significantly increased their fluency and understanding of technology use.

Publicity and Exposure

Individual Contacts and Requests. Teachers, technologists and administrators from schools around the nation and as far away as India and New Zealand have visited Horace Mann to learn about our technology initiatives. At least once a week, another request for information about Synthesis comes from outside the Horace Mann community.

New York City Independent School Technology Consortium. Many aspects of Synthesis have been described and discussed at several meetings of this consortium. Riverdale Country School has made plans to revise their computer curriculum to employ the Mastery concept in the 7th and 9th grades. Several other schools have contacted us for details about technology integration and/or the Mastery Assessments.

Columbia University Teachers College. Adam Kenner will present Synthesis and specific telecommunications-based projects as a "Key Presenter" at a two-day workshop entitled "Mathematics, Science and the World Wide Web" at TC on April 13 and 14, 1996.

New York State Association of Independent Schools. Synthesis was chosen as one of five model technology programs to be presented at a state-wide conference on technology planning to be held at Keio Academy in White Plains on April 25, 1996. The conference is geared for teams composed of Technology Coordinators, School Heads, Business Managers, Trustees and other key technology decision makers from each attending school. Adam Kenner chairs the conference committee. NYSAIS officials expect the day-long conference to be an extremely popular event.

National Educational Computing Conference. Duncan Wilson's proposal, "Two Years of Technology Integration: Planning, Implementation and Assessment" was accepted for presentation at NECC '96, in Minneapolis, Minnesota. Our presentation will be on Wednesday, June 12, the second day of the three-day conference. NECC is the largest annual educational technology conference in the world. Each of our technology pilot teachers has attended NECC in the summer before their first year of integrating technology into their classes. We are very proud to be presenting at this conference, and expect an overwhelming response to our program from educators nationwide.

Mathematics

Stock Tracking with Clarisworks Spreadsheets: The grade 7 Pre-algebra class has tracked and graphed stock prices using ClarisWorks Spread-

sheets. Time allowing stock research using the Internet will take place in May.

Exploring Pi with Geometer's Sketchpad: All Algebra classes participated in the Pi Day project. They used Geometer's Sketchpad to estimate values for pi based on increasing the number of sides in polygons to approach circles.

Algebra Review with Algebra Concepts: Algebra classes are scheduled to use Algebra Concepts as a study and review tool for the final examination.

Fraction Quest and Polynomial Puzzle: These projects reappeared for the second year, new and revised. Students in Introduction to Algebra and PreAlgebra tested and evaluated Fraction Quizzing programs written by the Upper School Program Design class. Students also used and evaluated a Factoring Puzzle program written by Computer Department faculty member, Janet Smith.

Health/Guidance

Using Hypercard to Create a Health Resource Library: As a year-long project, four 10th grade Health classes are creating a Hypercard Health Resource Library of common health related questions and topics. Classes in later years will update the library as new information becomes available.

MacDiet: Three 9th grade Health classes are using MacDiet in a nutrition analysis unit.

Web Research: One of Eleanor Henderson's students final Health research project was to create a Web page.

Visual Arts

Technology Integration Exploration in Visual Methods: High School (grades 9-12) Visual Methods classes used color and greyscale scanners, color and b/w copiers and ClarisWorks and Adobe Photoshop to capture and manipulate original drawings and photographic images.

Video Production: Kim Do created a proposal (approved in March) for the creation of a Video Production class for the 1996-1997 school year. This full-year class will use Adobe Premiere, camcorders and Power Macintosh 8500 computers to capture, edit and present original video presentations.

History

National and International Inspirer: In two sections of 9th Grade World History, students used a geography exploration game (the International Inspirer) to learn details of world geography and international trade. Three sections of 10th Grade American History used the National Inspirer to explore US geography. The sucess of the Inspirer programs paralleled that of last year.

Using Hypercard to Create World Art Galleries: Sandy Richter's three sections of Ancient World History are using Hypercard to create galleries of world art.

Multimedia Lectures: Andrew continues to use videodisc and computer presentations throughout the year.

American History Multimedia Milestones: Last year's multimedia presentations were not as successful as we would have hoped. The topics were too broad and the students' presentation styles were lacking. The project was redefined this year to limit the time period and include an outline and review questions created by the students. Bar code generation software was purchased to allow each group to create individualized presentation sheets.

English

Christine Pakkala changed to part-time status and did not continue the Lions in Training project this year.

English Department Computerization: Patrick worked to computerize the English Department office.

Using E-mail Conferences for Schoolwide Discussion: He helped Nick Faba develop an online discussion activity based on Frankenstein (the reading for the school's common book day). An online discussion forum for literary topics (Roundtable) was created on the school's FirstClass mail system.

Internet Research in Senior English Electives: Patrick's third trimester senior elective on conspiracy will use the Internet to research conspiracy theory and publications.

Science

Logal Photosynthesis Simulator was used in 2 Biology sections to introduce and reinforce the process of photosynthesis.

A.D.A.M. was used to illustrate and explore anatomy and physiology in 2 Biology sections.

Using Slide Shows to Enhance Lecture Presentations: ClarisWorks slide shows and PowerPoint presentations are used for lecture notes and presentations including clip art illusrtrations.

Workshops in Spreadsheet and Word Processor Integration for Lab Reports: 6 Biology sections have trained in spreadsheet use for data collection and graphing of lab data including frequency analysis.

Creating a Science Lab Package Electronically: Janet Kraus' Science Associates students scanned b/w line art from lab packets to be included in word processed handouts, tests and other materials.

Planning for BioBlast 1996-97: Janet Kraus was accepted into the BioBlast program to begin in the 1996-97 school year. This six-week module, which will be included in every section of Biology, is based on Internet research and communications with biologists and other participating school groups around the country.

Chemistry at Work: The Chemistry at Work videodisc continues to be used throughout the year as have experiments using analog temperature and pH probes.

ClarisWorks Commemorative Element Stamps: Students in all Chemistry sections created commemorative postage stamps for elements.

Using America Online in a Cooperative Research Project: Mary Beth Wilson designed and participated in a telecommunications-based cooperative research project on the inter-species competition of clover and wheat. Students in a New Hampshire school did the same lab activity and the two groups participated in a live chat on America Online to discuss the outcome.

Foreign Language

HyperGlot Russian Language Software: Sonya is using HyperGlot Russian language software which includes digitized native voices to speak words and phrases. Russian III students are currently using this software one day per week in their class.

German Presentation/Electronic Notes David Richards used an overhead and a wordprocessor to create a year long expanding collection of notes and examples in his German classes.

Foundations (7th Grade History/ English)

Grammar Lessons with ClarisWorks: Duncan has continued to use ClarisWorks to record and display grammar lessons and student-created grammar examples.

Simulation Games: He has experimented with a simulation game in his homeroom that teaches group decision making skills around topics such as the environment and media violence.

Electronic Conferencing for Book Day 1996: Duncan has set up an on-line discussion about the book of the year, *Frankenstein*.

The Synthesis faculty welcome your comments

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Pilot Teacher Perspective

Introduction

As we begin the process of assessing the Synthesis program at the Horace Mann School, we are confronted with a real challenge. Through our research we have found that while a great deal has been written about the use of computer technology in the classroom, very little work has been done in the area of assessment, especially the assessment of school-wide programs like ours. With few models to draw from, we decided to create an assessment program in house. The first stage of this assessment has focused on the Technology Integration component of the Synthesis program. This stage has taken the form of a survey and interview of the technology pilot teachers who have developed and implemented curriculum projects in their classrooms. From this first stage we hope to develop more formal assessment tools for the entire program. The following is a description of the survey, its findings, and some of our recommendations for other schools interested in developing programs similar to Synthesis.

Background

We had three goals in our preliminary assessment of the Technology Integration projects. First, we knew that we wanted to hear directly from each pilot teacher about the effectiveness of their projects. What worked? What didn't? What impact did their project have on the students? What changes needed to be made? Second, realizing that these teacher generated projects span six grade levels and at least seven distinct academic disciplines, we needed a way to understand what kinds of projects were being attempted. We wanted to develop a way of categorizing the projects other than by academic subject or by grade level. Third, we wanted to improve the way teachers communicate with each other about their use of technology. We wanted to create some kind of conceptual framework for our teachers so that they could support and encourage other teachers as they begin to use technology in their classrooms.

Through our research we did find some resources that provided useful ideas in designing an assessment tool (Gayaski ed. 1993), (Honey 1987) and (Rada 1992). The most useful ideas came from Wayne Nelson and David Palumbo in a paper published in the Journal for Educational Multimedia and Hypermedia. The main focus of Nelson and Palumbo's paper was a critical examination of how Hypermedia software is being used in teaching. In particular, they contend that all too often, computer applications cause students to view information passively instead of helping them to construct knowledge actively. While their particular focus is Hypermedia software, Nelson and Palumbo believe that most educational computer applications can be divided into three categories that describe how students use the technology to interact with information. The categories are Presentation, Representation, and Construction/ Composition. According to Nelson and Palumbo students are the most passive when information is simply presented to them electronically, whereas they play a more active role if the information is represented in a computer model or simulation. Likewise students play an active role when they take information and construct their knowledge by using the computer to create a composition (Nelson and Palumbo 1992).

It is from Nelson's and Palumbo's three categories of computer use that we developed the four categories for our survey. By making some alterations to Nelson and Palumbo's three and by adding the fourth category of Communication, we found that we were able to account for all of the curriculum projects developed by Synthesis teachers. It was our hope that these four categories would help us to fulfill two goals. We hoped they would help us to organize the 36 projects implemented over the past two years, and to provide teachers with the beginnings of a conceptual framework through which they could share ideas with other colleagues.

The following is a brief definition of each category followed by a list examples. We have placed each project into the category that we think best represents its main focus. We should point out that several of the projects could fit into two or even three of the categories.

Presentation

Any application where the primary use of the computer is to present information to the students falls into this category. This includes presentation tools prepared by the teacher such as ClarisWorks slide shows and Microsoft PowerPoint, as well as multimedia software on CD-ROMs and laser discs.

- Fraction Quizzer and Factor Puzzle
- Lecture Enhancement with Multimedia

(History)
- Using Chemistry at Work
- HyperGlot (Foreign Language)
- Grammar Lessons with Claris Works
- MacDiet (Health)
- A.D.A.M. (Science)
- Slide Show Lecture Enhancement (Science)
- German Lecture Notes and Examples

Representation/Construction:

Any application where the student works with information in a context such as a game, simulation, or computer model. Unlike Presentation applications, the student must play an active role in constructing knowledge when using Representation/ Construction applications. It should be noted that we have moved the term construction into this category. We did so because we think that these projects and the activities they encourage fit into the traditional definition of the word construction as taken from constructivist educational theory.

- 3-D Geometric Mobiles
- Geometers Sketchpad Honors Geometry
- Decisions Decisions: Group Problem Solving (Health)
- International Inspirer (History)
- Using Probes and Computers in Chemistry
- Early Human Writing: Exploration with Claris Works
- Simulation Games (Homeroom)

Composition

Any project where students use the computer to create a document that organizes and presents information falls into this category. Note that this is different from presentation because the student is playing an active role in creating a document. Even if that document is eventually presented, the main thrust of the process is the active composition of ideas.

- Modular Tiles Using Claris Works (Art)
- Book Illustration (Art)
- Comparison of Manual and Technical Painting (Art)
- American History Multimedia Milestones
- Middle School Publication Layout
- Claris Works Spread Sheet and Frequency Charts (Science)
- Minitel (Foreign Language)
- Stock Tracking with Claris Works (Math)
- Using HyperCard to Create a Health Resource Library
- Exploration in Visual Methods (Art)
- Video Production (Art)
- Using HyperCard to Create World Art Galleries (History)
- Spreadsheet and Word Process Integration for Lab Reports (Science)
- Creating Science Lab Package Electronically
- Claris Works Commemorative Elements Stamps

Communication

Applications that require the students to use the computer as a communications device.

The following projects fit into this category:

- E-Mail Journal Writing (Math)
- Using America Online as a Science Research Tool
- Electronic Conferencing about Being Human
- Using E-Mail Conferences for School Wide Discussions
- Internet Research in Senior English Electives
- Cooperative Research Project (Science)

Findings

The following is a description of our findings broken down into the four categories. Any findings that are relevant to all projects are included in a General Findings section.

Presentation

In many ways, these projects were the easiest to implement and had the greatest level of success for the amount of effort put into them. For all of the projects, teachers found that presenting information with the visual enhancements of multimedia and electronic projections enhanced their teaching. Students almost always responded positively.

We found that this category can be subdivided

into two distinct groups. The first group includes presentation tools created by the teacher. The main concern of the teachers here was the time needed to create the projects. Several teachers indicated that the time spent creating these electronic presentations was productive only if they were able to use the presentation more than once.

The second type of presentation tool consisted of multimedia professionally produced on CD-ROMs and laser discs. While most of these applications were well received by teachers and students, there were some concerns raised about their inflexibility. Specifically, the biology teacher who used the pig dissection program found that she was bound by the pedagogy of the program and was unable to modify the application to meet her own style of teaching. Another complaint about professionally produced multimedia came from history teachers who found that there were very few products available for topics other than American history and twentieth century history.

Representation/Construction

Of all the categories, this one was perhaps the best received by students and teachers. Students found that working with models and simulations was an exciting and different approach to learning. Teachers found that the high degree of interest on the part of students was an asset to instruction. One math teacher also noted that the Sketchpad program enabled many of her weaker students to have success with difficult concepts. Another math teacher noted that simulations often enabled students to look at more advanced concepts because they were less inhibited by the constraints of calculation.

Representation projects vary greatly in terms of the amount of freedom the students have in exploring or playing with the information in each application. Simulations like the Decisions Decisions game, while allowing some student choice, had a relatively closed set of outcomes. Simulations and models with closed outcomes may be very interesting to students at first, but could not be reused. Therefore an application like Decisions Decisions may only be useful for one or two lessons. On the other hand, a math tool such as Sketchpad is much more open in the way it allows students to use it. Applications with open outcomes were more likely to be used repeatedly and for a variety of lessons without a decline in the level of student interest. The downside of applications with open ended outcomes is that using them well usually requires more preparation time by the teacher.

Composition

Despite the fact that this category had the largest number of projects, it also received the largest number of complaints from teachers and students. In short composing on the computer is time consuming and difficult. While there have been several very successful projects done by individual students using software such as HyperCard, many of the teachers surveyed felt that it took too much time to develop and implement a project. Likewise the students felt that the projects took too much time.

Teachers attribute the time problem to their own lack of technical training, the current level of the students' technical skills, as well as the difficulty of access to specialized technology such as scanners and Quicktime Video. Several teachers said that they would be reluctant to try a composition project again without more training, more planning, and better access to facilities. However teachers that have repeated composition projects, such as the multimedia projects done in American History, found that the projects worked much better the second time around.

The same concepts of "openness' and "closedness" mentioned in the representation category was also noticed by art teachers. While they enjoyed the freedom to copy, duplicate and edit that the computer gave the students, art teachers were very aware of the limitations of each program. One teacher said that the format of the application's tools influenced the work done by students too much. For example, the tools in the ClarisWorks Painting Environment suggested to students only to draw regular geometric shapes.

Communication

Of all the categories, communication received the greatest range of results. On one end were some of the least successful projects and at the other some of the most successful. For all of the projects success seemed to be determined by the level and type of teacher involvement. The projects that were conducted during class time such as the Cooperative Research Project in Science, were very well received.

Despite some initial awkward moments as the teacher became familiar with the equipment, she found the link with a class from another school to be very useful. Not only did it increase the data pool for the experiment that both classes had conducted independently, but it also actively demonstrated to students the idea the science is a collaborative process.

In contrast, communications projects that were done outside of the classroom setting were much less successful. It seems that without the influence of the teacher one of two things happened. Either interest in the discussion or chat fell to the point were almost no one participated, or the level of discourse degenerated to insults and one liners. One project that illustrates both sides of communication is an electronic chat session done by an eleventh grade English teacher in conjunction with an Internet research project. The chats were begun as part of the class, but after a few weeks the teacher let the chat continue outside of class time and with less supervision. This teacher was surprised at how quickly the level of discourse declined.

We believe we will have more communications projects in the near future as a result of the school's new T1 connection to the Internet. This will allow all students access to the Internet as well as expanding the scope of what they are exposed to online.

General

Time is the greatest single factor in the way teachers viewed all of their projects. They valued any project that seemed to improve the students' use of time on a particular task, and they tended to dislike anything that seemed to take up too much time. The two factors that affected the amount of time spent on a project were access to the technology and students' and teachers' familiarity with the software application. When students and teachers had to learn a lot about the application before they could learn about the subject matter, the projects tended to be less successful. Students became frustrated, and teachers felt that the project was unproductive. Whereas, when the application was relatively easy to use and therefore transparent relative to the information being taught, the success rate of projects was high. Likewise the learning curve tended to be shorter and the success rate higher when a project drew on skills learned in the Mastery Workshops.

As far as access to the technology is concerned, this problem will take more time to solve. The demands placed on our two computer labs makes it very difficult to schedule enough time for larger projects. This problem is particularly acute when a project takes longer than planned or when time in the lab is lost due to snow days, illness, etc.

To return to the question of the four categories themselves, we have to say that our findings were mixed. The four categories, while not perfect, were very helpful to us. We did see striking similarities in each category even though the projects being assessed crossed several academic disciplines and spanned several grade levels. Overall the categories helped us to organize our findings and to see some of the significant issues with each type of project including the strengths and weaknesses of each type.

We believe that we have defined a set of concepts that our teachers can understand and use when talking about their projects. We also expect that this information will help new pilot teachers who join Synthesis.

Admittedly, several teachers were confused by the categories at first and several teachers did not see any value in working with teachers from outside their discipline. We blame some of this confusion on ourselves for not explaining the categories clearly and providing concrete examples to illustrate them. We should also point out that there are many teachers at Horace Mann who do not want to use any computer technology. This includes some pilot teachers who could find few applications for their classrooms. Instead of viewing this as a failure of the program, we realized that choosing not to use technology is a legitimate outcome of the Synthesis program.

One brief word about surveys -- we definitely learned the hard way that teachers do not like paper work. It took close to a month to complete a process that we thought would take a week. In the future we think it might be better to ask that the evaluation of each project take place immediately following the project.

Our final finding goes back to the ideas of Nelson and Palumbo who theorized that computers are not being used effectively in the classroom because they are often used in ways that make students passive viewers of information. Judging by our

list of projects, we have not fallen into the pattern that Nelson and Palumbo describe. The majority of our projects at Horace Mann require students to use information and ideas actively. Furthermore the presentation projects that were attempted were very successful and in no way encouraged the students to be passive learners. In their defense however, we can see how Nelson and Palumbo's concerns could become a reality. Clearly the projects that require active student involvement are more complex and require a great deal of time in planning and in execution. We can image how teachers who are unable to put in the time preparing curriculum projects might limit themselves to software which causes students to be passive.

Conclusion and Recommendations:

After two years of Synthesis and just one year of assessment, we realize that we are at the beginning of a process. We think that we have made strides forward in effectively assessing our program. It is our hope that we can learn from these successes and failures and share our findings with others.

In closing, here are the five recommendations for teachers and technology specialists that we would make to any school beginning a Synthesis style project:

Preparation Time- Make sure you set aside enough time for teachers to familiarize themselves with the technology they plan to use. This includes hardware and software. Such a training period should ideally occur outside of the school year (i.e. the summer). Once the school year has begun it is very difficult to find the time to learn how to use everything.

Practice - Teachers should try out their lessons before they do them with students. If teachers plan to do a composition project, we strongly urge them to try the project themselves first. Produce a prototype that will help them see the trouble areas that their students are bound to run into. They can also show the prototype to the students, many of whom do not know what a good multimedia presentation looks like.

Support - The supporting relationship between a pilot teacher and the technology specialist will not develop unless time for them to work together is structured into the program. This time can be used for planning, training, and evaluation. Develop a process such as a survey that forces teachers to write about their projects soon after they have completed it. This will ensure that a record of the project is kept and will encourage the teacher to try to improve on the good projects and not abandon the unsuccessful ones.

Share - Like support, this must be done pro-actively. Set aside time for teachers to meet and discuss their projects. They need time to vent frustrations, share ideas, enjoy their successes. Sharing like this will also reduce the reinventing of the wheel phenomenon into which educators so readily fall.

Be Realistic: - On average our teachers planned 3 to 5 projects and successfully completed 2. One project per term may not seem like a lot but it is. The teachers who are most realistic with their time and their abilities have had the most success in the program. And the successful projects are the ones that are most likely to be repeated and shared with other teachers.

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