Multimedia Arts Learning in an Activity System:
New Literacies for At-Risk Children.

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Abstract

This study concerns a multi-year after school arts technology program, the Multimedia Arts Education Program (MAEP). The Tucson Pima Arts Council (TPAC) sponsored MAEP in downtown Tucson for low-income youth. A five-semester curriculum was developed to introduce multimedia literacies in the electronic arts workplace and provide tools for students to become creators as well as consumers of new literacies. In this six-year study, formative data on an early cohort of participants was collected over an eighteen-month period using participant observation in the labs and interviews with students and their parents or guardians. A pre- and posttest questionnaire measured changes in perceived self-efficacy and attitudes about art, technology and learning. This study also looked at long-term effects of participation in MAEP. Program graduates were contacted four years later and asked about their high school success (defined as graduation) and career directions. The study findings are reviewed and analyzed using Cultural Historical Activity Theory (CHAT) for retrospective analysis. The paper includes a description of the MAEP activity system and the interrelationships within the system. Survey instruments and a sample lesson outline are included in the appendix. The program was successful for many of the participants who completed the five semesters and earned a computer to go with the new skills to use it.

Introduction

Multimedia Arts Education is art education with the electronic tools available to the arts. Media Arts is a relatively new discipline; compared to Dance, Music and Drama, it is brand new. That there is now an art form called "multimedia" is indication of the speed with which the ability to manipulate line, texture, sound, motion and color for expressive purposes is developing. Computer graphics, animation, video production and desktop publishing are affordances of the modern era and offer new tools for artists and students.

Cultural Historical Activity Theory (CHAT) is a useful framework for analyzing a complex human endeavor in the arts. Activity theory takes human activity as the basic unit of analysis. It focuses on the subject, an individual or group, with an objective, and the mediating tools they use. An activity system exists in the context of a community or culture with a division of labor and rules. Through the artist's efforts the objective is transformed into an outcome. The system moves through time and each change in one aspect is reflected in all the others.

Text for many young people consists of many interrelated modes of communication (Kress, 2003). This phenomenon is known as new literacies (Street, 2003). New literacies studies acknowledge the multimodal nature of our lives, at school, at work, in the community and for survival. Literate persons are expected to read and produce messages in a variety of forms: writing, speech, music, image, and gesture; they deal with changes in the shape of knowledge and forms of learning as communication media shift from the page to the screen (Snyder, 1998). The new media tools that create these multimodal messages and the ability to use them are now accessible to young people as they have never been before.

The Multimedia Arts Education Program (MAEP) was established to foster development in arts technology, art and design, literacy, and other school-to-work skills. This study was begun as a formative, or design, experiment to gather data as the program evolved and use that information to foster its development. A second goal of this study was to follow on with some MAEP graduates to note outcomes in terms of high school graduation and higher education or employment.

MAEP differed from other after school time community arts programs (Heath, 2001) and technology-oriented drop-in programs for young people, such as the Fifth Dimension program (Blanton, Greene, & Cole, 1999; Cole, 1996; McNamee & Sivright, 2002). It was unique in its duration (five semesters, 600 hours). This required a significant commitment on the part of the middle school students and their families to complete the program. In addition, students earned small stipends for achieving skills benchmarks and completing projects in each discipline. Most importantly, students who completed the program received a computer and a printer upon graduation.

I was with the program since the beginning, first as part of the grant writing team and, prior to receiving a research grant, as program evaluator and consultant in various capacities with TPAC, and ultimately, as principal investigator. My own research (Betts, 2003) and the experience of many middle school teachers showed that there are few limitations to what students could do with these tools and what these tools could do for the students. There were many desirable pedagogical goals possible and as the program evolved as a formative study (Reinking & Bradley, 2004), there were many opportunities to review and reflect on a variety of theoretical bases that influenced the research. MAEP was active from 1996 to 2002, at which time the program was phased out.

New Literacies

"In this complex world, being literate no longer means learning to read and to write."

(Bean, Bean & Bean, 1999, p. 439)

New Literacies (Leu, Kinzer, Coiro & Cammack, 2004; Leu, 2002; Gee, 1998) is an expanded concept of literacy based on situated practice (Street, 2003). Leland and Harste (1994) discussed literacy in terms of transmediation, or "movement between and among communication systems" (p. 340), such as happens when learners create meaningful art and graphics, or choose illustrations to make meaning of text. Such multimodal learning encourages the development of abilities other than verbal, which is typically emphasized in school settings (Semali, 2002; Kress, 2003).

New literacies are also situated literacies, not abstract or predetermined (Lave & Wenger, 1991), a practice and not just an event (Street, 2003). The activities of problem solving and design are always specific to a particular set of circumstances, a situation. These practices always take place in some context that determines their form and usage (Gee, 2000).

'Mere literacy' centers on language only, usually on a singular notational form of language at that, conceived as a stable system based on rules such as mastering sound-letter correspondences and decoding word by word. This is not the multi-modal text-rich environment that young people encounter. What they do encounter are situated new literacies (Cope & Kalantzis, 2000; Gee, 2000, 2003) in the "post-typographical world" (Reinking, 1998).

A comprehensive approach to teaching new literacies would allow students to find the communications modes in which their strengths may lie other than text, engaging students in the discourse community of art technology, where technology mediates an information ecology (Nardi, 1996). It would foreground student interests in an interactive setting in which students are able to connect in new ways with the material being taught. It would use real-life applications that allowed students to bring into the classroom and build on their own knowledge and experience (Moll & Greenberg 1992; North Central Regional Educational Laboratory, 1994). And, it would promote a collaborative learning environment where students learn from the artist/teacher and from each other. Kist (2000) suggests that "In such a classroom, students would be free to "read" and "write" in a variety of these "languages of the mind"' and that, "In such a classroom there would be ongoing, continuous usage of multiple forms of representation" (p. 711).

Bruce & Levin (1997) looked at the role of technology in education. In their analysis of technology's support for inquiry experiences they found that technology supported student searches for knowledge and information. They created a taxonomy of educational technology based on John Dewey's (1943) classification of the parts of the curriculum as: inquiry, communication, construction, and expression. Using their taxonomy, they classified a set of "advanced applications of technologies" that had received grants from the National Science Foundation. Of 73 studies they examined, 43 supported Inquiry, 27 supported Communication, 3 supported Construction, and none were found to be supporting Expression (Bruce & Levin, 1997). This may not be the case today, but the part that was missing, expression, is well served by a program in multimedia arts education such as MAEP.

Cultural Historical Activity Theory (CHAT)

"Activity theory holds that the integral units of human life - humans interacting with each other and the world - can be conceptualized as *activities* (Italics in original) which serve to fulfill distinctive motives."

(Scribner, in Tobach, 1996, p. 231)

In complex human interactions like MAEP, the activities, actions and operations of individuals in the setting change over time. Cultural Historical Activity Theory (CHAT) makes it

possible to investigate the mediational processes that innovative tools can bring to educational settings. CHAT views human consciousness as emerging from tool-mediated object-oriented activity (Engström 2004), and it emphasizes the socio-cultural aspects of learning as well as the cognitive, acknowledging the nature of the developing learner.

MAEP was a dynamic and evolving setting: Change was everywhere. New art tools, such as computer graphic software and new ideas were the currency of the activity, and developmentally the students were each moving into or through adolescence. They moved through the hierarchy of activities, from operations to actions to full MAEP activities. Because of this ever-changing environment, snapshot measures of instances of performance or behavior were not useful, lacking the individual history and context.

Activity includes working with others inside a system of culturally defined tools, signs, and symbols (Brown & Cole, 2002). To link the concept of computers as mediating tools that allow us to interact with our environments (Nardi, 1998), for example, or to understand scientific information based learning activities (Rubisov & Magolis, 1996). CHAT offers a "minimal meaningful context" for understanding human and social activities; includes the "actor"(s) whose agency as participant is the point of view of the analysis and the object acted upon as well as the dynamic interactions of both (Barab, Barnett, Yamagata-Lynch, Kurt, & Keating, 2002). CHAT takes into account the goals and motives of the learners in the context of the setting and its social aspects, focusing on interactivity of the various aspects. In reciprocal relationships, participants transform objects and vice versa, and each system component influences this transformation.

An activity system, as visualized by Engström (2004), consists of individuals or subjects with short-term goals, or overall objectives, who make use of mediating tools to achieve specific outcomes. The activity setting includes the culture that is created, the rules that are negotiated and the roles that participants play. Figure 1, below, is the Activity Triangle with the nodes and two-way influences between each. It is important to point out that this two-dimensional graphic does not represent the element of time or development; the system's interrelationships are constantly changing.
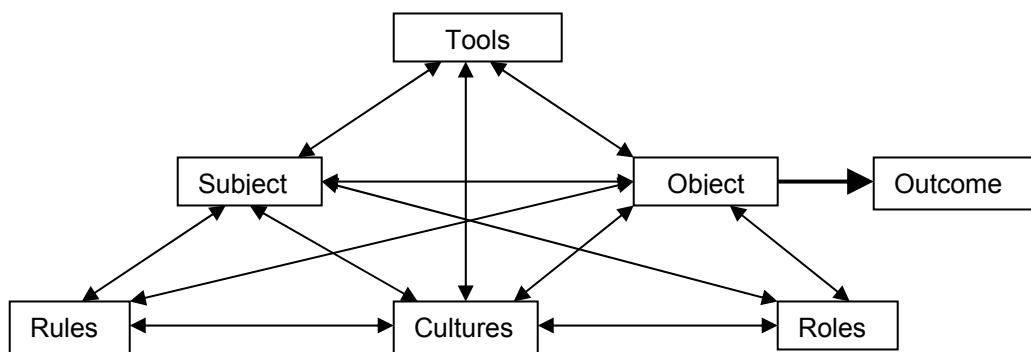

Figure 1. Activity Theory Triangle (After Engström, 2004)

A description of the MAEP activity setting includes relationships between the subjects, their objects or goals, the tools they used, the roles they played, the culture or the context in which they worked, the rules that were negotiated, and the outcomes, both intended and unintended. All these things interact and change over time. In our case, the subjects - participating middle school students, were motivated toward an object, the solution of a problem or completion of a course of study, anticipating an outcome, a result or product such as learning new software or being a designer.

MAEP activity was mediated by a variety of tools: such as computers, computer programs, art supplies, and the language and discourse of aesthetics and art technology. The structure of the activity was constrained by social factors including shared conventions for student behavior (rules), and by the division of labor in the activity setting (roles), such as learner, teacher, critic, etc. All this activity happens in a context (culture). The location of the labs in a professional setting, for example, contributed to the particular culture of MAEP. Within a dynamic learning activity setting, we can ask, what were the motivations, interests, skills, and strategies of the students and their families? What tensions or contradictions existed? How do they change over time?

After School

Educational activities in after school settings have a long history of being useful and interesting to both students and their parents (Belle, 1999). The important role of the arts in programs for at risk youth has been acknowledged for some time (Heath, 1994). An estimated eight-million school-age children are home alone after school (U.S. Department of Education, 2001). In 2001, 38 percent of children in kindergarten through eighth grade participated in after-school activities at least once per week. Twenty-seven percent participated in sports, 19 percent in religious activities, and 17 percent in the arts (ChildTrends, 2004). Increased attention to such programs acknowledges the risks to middle school children during the hour between school and home (Halpern, 2002). After school programs of many descriptions provide responsible adult supervision for youth, constructive activities and insulation from harmful peer pressures during high-risk hours (Fox & Newman, 1997). Common goals include psychosocial development, education, recreation, and career awareness (Schwartz, 1996). No impact assessment has been done of the many programs that are in place; however, studies of programs for low-income children have shown positive effects (Posner & Vandell, 1994; Betts, 1999). Such programs offer opportunities to learn and use new literacies (Gee, 2000) of many sorts in a context that mediates between school and everyday life.

Vygotsky (1978) identified two kinds of knowledge in the lives of students, "schooled" knowledge and "everyday" knowledge. The difference is quite clear to students, although making connections is sometimes difficult for them. Eisner (1994) pointed out the importance of these connections between school knowledge and students' lives outside of the academic environment. Transfer of learning will occur, he asserted, when students encounter tasks and relationships similar to those outside of school. Facts and ideas can be engaged with new skills. These skills call forth new ideas and the transmediation of those ideas in a reciprocating spiral of learning from idea to tool and back as the effects of and with technology are felt in tandem (Salomon, 1990).

The arts education community, both locally and nationally, is an important source of successful after school programs that keep young people on track and promote a variety of useful art skills and activities (Paz & Betts, 1997). Heath (2001) in a 10-year study of 124 youth programs in after school art settings found that "The influences of participation in the arts on language show up in the dramatic increase in syntactic complexity, hypothetical reasoning, and questioning approaches taken up by young people within four-to-six weeks of their entry into the arts organization" (Heath, 2001). After school programs may make a difference simply by offering alternative constructive activities for students outside of school (Shann, 2001) and by creating a "3rd space" (Soja, 1996; Moje, Ciechanowski, Kramer, Carrillo & Collazo, 2004), a place that bridges the home and the school or work environments and allows students to participate in new discourses.

MAEP grew out of a series of successful after school and summer arts programs that the arts council had been running for number of years. The idea of focusing on art technology started with a ceramics workshop and a computer graphics workshop, which lead to the creation of MAEP to give young people skills that would be useful in an arts workplace.

Arts Integration

Arts integration is a strategy for interweaving arts activities into the general curriculum that can help students deal with classroom concepts on their own emotional terms. (Betts, 1999; Burnaford, April & Weiss, 2000; Eisner, 1994; Gardner, 1991; Author, 1999; Goldberg & Phillips, 1992) We learn by doing, and experience, as Dewey wrote in *Art as Experience* (1934), is central to learning. Phillip Jackson (2002) demonstrates how, in Dewey's system, the presence of arts-based activity intensifies an experience for a learner. According to Bruner (1991), we each develop "tool kits", which allow us to make meaning in many different media. The integration of art experiences into the process of education facilitates the construction of new knowledge by young people based on this mediation. The artistic content of the actions and operations of the MAEP provided a parallel means of connection or engagement for the learner. Arts integration puts art in a functional role as well as a design role, yielding instrumental outcomes (Hamblen, 1993).

Arts experiences using technological tools reflect the visual culture (Freedman, 2004; Mitchell, 2002) in which the students exist in virtually all aspects of their lives. And when emphasis is on the student's relationship to the technology (Freedman, 1996), not in reifying the computer, the experience "seems to provide confidence and skills…" (p. 47)

Heath (2001) in a 10-year study of 124 arts-based youth programs in after school settings found that "The influences of participation in the arts on language show up in the dramatic increase in syntactic complexity, hypothetical reasoning, and questioning approaches taken up by young people within four-to-six weeks of their entry into the arts organization" (Heath, 2001). Eisner points out that "the sense of vitality and the surge of emotion we feel when touched by one of the arts can also be secured in the ideas we explore with students, in the challenges we encounter in doing critical inquiry, and in the appetite for learning we stimulate" (Eisner, 2004, p. 9).

We utilize a growing array of sign systems to express and make meaning (Gee, 1996). Successful learning environments reflect that multimodality (Suhor, 1992; Berghoff, 1993). Technology can provide means to create a flexible curriculum to meet each learner's strengths based on learning style, or Gardner's (1991) concept of multiple intelligences.

MAEP Objectives and Setting

The Multimedia Arts Education Program (MAEP)

This program was designed to meet three objectives: job skills, art technology skills, and multimedia literacy. Initial funding for pilot programs came through the federal Job Partnership Training Act that supported school-to-work training. The field of art technology was known to be an important segment of the community's economy. Arts integration studies done at the arts council and elsewhere showed that using the arts and aesthetics for instrumental outcomes (Hamblen, 1993) was a viable educational strategy. Students learning to use new multimedia tools required them to become competent users of new literacies. The arts were a critical mediating factor in this approach to computer and media technology, bringing aesthetics and affective response into the setting.

MAEP artist/teachers were professionals in their area of art technology; several were experienced teachers. The large, one-story TPAC building, located downtown, had room for five MAEP computer labs, and also included an art gallery as well as offices and meeting rooms. Many local artists passed through and/or visited the labs and influenced the culture of the facility.

The curricula developed and used in the labs each included art and design, technology, and literacy components. Students learned several professional level computer application programs and tools, such as Adobe Photoshop™ and Quark Express™. They learned to make and discuss æsthetic considerations in design, to develop a critical eye, and to revise. They kept journals, wrote proposals for their projects and created storyboards, video logs and scripts, as well as poems and stories.

Students in the Language Arts lab worked with word processing and basic desktop publishing tools. There was an emphasis on use and review of English grammar and composition as they interviewed local businesses and produced a pamphlet with pictures and text. In the Computer Graphics lab students learned photo-manipulation, drawing and color printing. Various projects such as letterhead, calendars and logos involved the integration of many electronic arts tools. The Animation students developed narrative storyboards and two-dimensional computer animations. The Video lab had several camera kits with lights and microphones, editors, and a special effects generator. Students learned basic production techniques as they worked through group and individual projects. The Portfolio lab, taken in the last semester, emphasized revisiting earlier projects and developing multimedia presentations based on that and new work.

The program rules made students accountable for attendance and punctuality, as well as for appropriate dress and behavior. Students were eligible to receive a stipend of fifty-dollars each semester ($25 on demonstrating the required skills mastery for each lab, and $25 for completion of their individual final projects). When they successfully completed of the five-semester program, each student received a desktop computer of his or her own. This was a very motivating aspect of the program, as all but one or two of the families involved did not have a computer at home.

Parental involvement was an important part of MAEP. Many students relied on their parents for transportation to the downtown site. Young people who were interested in the program were interviewed along with their parents or guardians. As the program became established, the parental involvement increased and at the end parents helped arrange for the computers for graduates. MAEP got help with recruitment from parents and families who spread the word.

Curriculum Development

Each semester students worked with artist/teachers who were professionals in their field. Within general guidelines, each artist-teacher was responsible for his or her curriculum (Betts, 2003). In order to focus a project-based curriculum, each artist-teacher developed a series of questions based on what the students would need to learn to meet the requirements of the lab. These brief skills tests were given to students in each lab at the beginning and end of each semester. The lab activities were structured so that students would be able to meet those objects. This process was helpful in getting the artist-teachers focused on curricular needs and coordination of the five labs.

There was enough staff turnover to require orientation and professional development activities. The regular faculty meetings were devoted to establishing policies and included workshops on behavior management and demonstrations of curriculum design. Model lesson plans were prepared for new artist-teachers. (See Appendix D, for an example graphic arts curriculum)

Research Goals and Methodology

In the first 2 years of this formative study, I focused on the development of the MAEP curricula and collected base line data on students' perceived self-efficacy and attitudes about art technology. A questionnaire was created to gauge these effects, as well as students' literacy skills development, evidence of aesthetic response, and school-to-work skills acquisition.

The following questions were addressed:

1. What was the relationship of participation in MAEP on students' perceived self-efficacy, and attitude about art, school, technology and work?
2. What was the relationship of participation in MAEP on students' literacy skills?
3. What were the best ways to develop school to work connections for students?

In addition, a longitudinal study lasting 5 years looked at:
1. Student success in high school,
2. The impact, if any, of the program on extended families, related to MAEP experience,
3. The impact of the program, if any, on students' college and/or career choices.

Participants

Approximately 1000 students entered the program and completed at least one semester. About 300 students completed the entire program. The average enrollment was 38-40 students, roughly half boys and half girls, with 6 to 9 students in each lab. Most came from homes where Spanish was spoken and were bilingual to some extent. Several students in each class were English language learners. Students started the program in 6th or 7th grade and finished before entering high school. For example, all but two students in the spring semester 1998 (N=44) were on free or reduced lunch programs at their school. 54% were bilingual Spanish, 79% Hispanic, 7% Native American, 7% African American and 7% Anglo.

Students were admitted to the program based on their family's qualifying for free or reduced lunch at school, and on their stated interest in making the commitment to the five semesters. There was no audition required and although many students could show evidence of their arts skill, there were those who could not. Pre-enrollment interviews with interested students and their parents or guardians emphasized the importance of the commitment required by students and their families. Students in the program were required to maintain a "C" average in school in order to continue.

Data Collection

Formative data on an early cohort of participants was collected over an eighteen-month period using participant observation in the labs as a way of making appropriate adjustments to the curriculum and context. Data was collected continuously and fed back into the system to help it succeed. A questionnaire, described below, was created and administered regularly to gauge student perceived self-efficacy and attitudes about art, school, work, and community. Participant observation was conducted in each lab and for the program as a whole by the P.I. and by university students working as teaching assistants. Interviews with students and their parents were also conducted. Students' high school English or Language Arts teachers were contacted to get their input on how the MAEP graduates were doing. We interviewed the MAEP director about how the program evolved and how problems of sustainability overcame the program.

Instruments

Participant Observation: As Principal Investigator, I spent time at MAEP on a weekly basis over the first two years of this study. I visited in each lab observing and occasionally helping. I attended regular faculty meetings and reported my observations from the labs. I facilitated development of

program guidelines and curriculum by working with the program director and the artist-teachers. I interacted with the students and was familiar with many of their projects and products.

Perceived Self-Efficacy And Attitude Questionnaire (PSE&A): The PSE&A questionnaire (See Appendix B) was created in the second year and administered twice a year. Questions regarding perceived self-efficacy, frequency and types of arts experiences, and attitudes towards the arts and related activities were included. There were also literacy skills items to determine student's language abilities. Because students did not move through the program at the same rate, some students took the PSE&A twice in their career, others three times. For this study there were 99 completed pre-tests and 66 posttests.

Student Exit & Follow Up Interviews: Interviews with the students were recorded shortly after graduation from the program. The graduates talked about their experiences with MAEP. Interviews were loosely structured and were conducted at the arts council and recorded. We talked about what their goals were for the program, how the program had affected them and their families, how they felt about their parents' involvement, and what they particularly remembered about the program. We were also able to talk with many of them a year or so later to get them to reflect on the experience and its effects.

Parent Interviews: Sixteen parent/guardians or sets of parents/guardians were interviewed about the experience of their recent program graduates and the program's influence on their homes and on school. The interviews were structured and were audio taped and transcribed. Some of the questions asked in these interviews were: "What do you think was the most important thing in your child's participation in MAEP?" "What did the program mean to you, as a parent?" (See Appendix A.) At the end of each interview, parents were asked to respond to ten scaled questions that helped them assign values to various aspects of the program. Such as, "How much did the multimedia program help your child with his/her self-esteem?" And " How much did the multimedia program help your child with his/her writing skill?

Journals: At the beginning of the semester each student was given a notebook to use as a journal for drawing and writing. The instructors used these differently, some requiring reflections, some making assignments, and some just suggested using them for note taking and sketches. The entries were often quite personal, related to family matters and reflected the problems and difficulty of early adolescence. Most were returned to the students. However, many of the sketches turned up in finished projects, some of the personal narratives turned up in video scripts and animated characters. Often the artist-teachers would read and respond personally and at times the program was modified in response to what the students wrote in their journals. They were read but not collected and therefore did not contribute to the summative portion of this study. They served the formative aspect of the program study in that teachers could react to the student journals to improve the program.

Artifacts: Some examples of student work are in Appendix F & G. Although they all started as beginners, their work showed some mastery of the new tools and emergent aesthetic qualities. These young people produced high quality work in print and digital form, including graphic designs such as logos and story animations, poetry, newsletters and video programs.

Findings

Participant Observation

I observed a consistent attention to modeling professional practice and emphasis on the importance of communication. Student choices were honored and the content was usually expressive of their own tastes and interest. While there were occasionally issues of deportment and indications that some of the students had attention and/or behavior problems. Behavior management specialists from the University were invited to meet with us and develop professional development modules for the artist-teachers that were helpful in managing their lab classes.

The graduate students also did participant observation in the labs were they worked. They became valuable members of the community and often helped to bridge between the adult teachers and the middle school students.

A typical day's MAEP activity during the school year began when school let out with a trip downtown to the arts council, either by bus or car pool. Students rotated responsibility for putting out snacks and something to drink and cleaning up. Lab time consisted of more direct instruction at the beginning of the semester and more independent or collaborative creative work later in the semester. Students spent time learning the operations with mouse and stylus and doing exercises that fused these operations into actions. Through practice came competence and participation in the creative activity system of each lab.

Parent Interview Findings

We found through the interviews with the graduates and their parents that often it was in the home that their new knowledge and skills were first appreciated. The arrival of a computer into the home for the first time, along with an experienced user, able, and often willing, to show other family members what he or she had learned, had an impact on an extended family's "funds of knowledge" (Moll & Greenberg, 1992). In the sixteen interviews with parent/guardians of recent graduates, they talked about the commitment that their children had demonstrated in completing the program. "He learned commitment and his self-esteem grew," said one mother. Recognizing her son's growth in the program. Most parents mentioned that they were aware of what these students had given up, such as sports, clubs, and other after school activities. Several parents interviewed were curious about the powerful new computer applications that their children now knew how to use and that they had never heard of. Although several parents did use computers to some extent at their work, art technology was outside their experience.

Interviews settings were varied and the scheduling often problematic. We met and recorded interviews at the public library, at the arts council offices, in their homes, and in a parked car on the street in front of the house. Most parents played an important role in helping their children meet the long-term commitment to MAEP. These parent interviews showed a high degree of satisfaction with the program. "There was a good mix of kids (at MAEP) mixed ethnic backgrounds, ages, gender. They learned about community and projects…" Several said that the fact that their child completed the program was the most important aspect for them. Many said that it helped them grow up. "She learned new computer skills, became more disciplined, involved, committed to studying… (she) learned to finish what she had started." Several parents remarked about the job-related skills that were required. Most were unfamiliar with the art technology that lies at the heart of the program, but appreciated the computer skills the students acquired.

The parents' responses to these questions in particular helped us to understand the relationship between the MAEP and home. Here are the basic questions that they responded to and a summary of what they had to say:

1. What do you think was the most important thing in your child's participation in MAEP?

Commitment and responsibility were the most frequently mentioned issues.

Parent 1: "I think just that she learned, I'm not sure if the right word is responsibility, just the drive that she had to do something. She had to be there at a certain time to accomplish it and just her dedication. The commitment, I guess that's the word I want to use. She was able to make the commitment and she stuck with it. It was a long five semesters almost two and a half years that she went so I think that that just teaches them the basics of everything. She got to learn a lot. Things that they don't normally teach them in grade school… The commitment that's something they can't teach you either, really."

Parent 2: "Um, commitment, uh he really...He enjoyed this so much it wasn't a problem to get him there because he was very eager to keep on going. It was easy."

Parent 3: "I think the most important thing was that M., number one, learned commitment. Ah, it was very hard initially for him to think that he was going to spend and hour and a half two hours elsewhere coming out of school. There was a couple times where he faltered and he wanted to do other things at school. So he did take two semesters off. But, commitment and dedication and then number one, learning his self-esteem just went, popped up. He learned so many things he never thought he could do. So I think those are the two main most important."

2. What did the program mean to you, as a parent? What did it cause you to have to deal with?

Transportation was the most common issue. Many parents mentioned that they had to learn a new vocabulary as their children talked about what they were learning. The parents' commitment and belief in the program cannot be overlooked as an important factor in the majority of students who completed the program.

3. How much use has the computer gotten at home?

"Every day" was a common response.

Finally, parents were asked to rate several items based on their perception of their child's experience with the program. On a scale of one to ten, one being very little and ten being very much, how much did the multimedia program:

1. help your child with his/her self-esteem?
2. help your child artistically?
3. help your child with his/her writing skills?
4. help your child learn responsibility?
5. influence you/your family?

The responses to this item were very high, 8 to 10 in most instances. The few lower scores, in the 5 - 7 range, were explained by saying that the child in question was already doing very well in that area, such as writing or responsibility, and so didn't need the program's help in that area. The last question, about the influence of the program on the family, typically got a very high score, indicating that there was a great deal of connectedness between MAEP and the home lives of the participants, which parents generally appreciated. It was often noted that the program was a topic of conversation between parent and child.

What we gather from these interviews is that the program had an effect on the family. Parents were clearly respectful of the new skills and abilities that they saw in their children. For example:

> "… The program taught him a lot of areas that usually kids don't get experience like it, like videotaping, editing, just using a computer for graphics."
>
> "…I've seen a big change in her. She had to learn to budget her time, prioritize."
>
> "…It kept him thinking that he was really a student that's worth something. It added some worth to him."

These parents of students in our original cohort were part of the early years of the program.They established a pattern of parental involvement that helped to sustain the program later. They often recommended the program to friends and relatives. Later in the program's life, when a lack of financial support threatened to curtail it, several wrote letters to the mayor and city council about the benefits of the program.

Student Exit Interview Findings

The students we interviewed, who had completed five semesters of the MAEP, were pleased to be graduating. They were proud of what they had accomplished for the most part, and each had some aspect of their multimedia work that they were happy to recall. They saw it as substantially different from their school experience. Most felt that the language arts lab was the most helpful in their schoolwork. The attention to grammar and composition met their immediate needs in the classroom. There was a wide range of plans for after high school. All saw high school graduation as a clear and attainable goal. They had few complaints or suggestions, other than the snacks. A few of the more technologically advanced wished there had been more computer hardware and software for their use. They often reported that their family was proud of their accomplishment. The new computer that they were anticipating would have a place in their home and they were already fielding questions as to access by family members. The desired outcomes they had for themselves and the program were generally similar and related to new computer abilities and arts experiences. They reported that they were motivated by the educational incentive payments, some more than others. Several put these checks away for software or a printer to use with their new computer.

The participants in our sample cohort were interviewed shortly before their graduation from the program either at home or at the arts council. We used a structured interview so that they each had an opportunity to address the same issues and make their own comments. Here are some representative responses:

1. How is your family with this whole activity? Do you get a lot of support?

These students got a great deal of support from home. They spoke of their parents being proud of them and willing to provide transportation in particular so that they could get to the program on time.

2. What plans do you have for your new computer at home?

The program graduates had thought about a place to put their new computer at home and had plans for what they were going to do on it, including a shopping list for software and upgrades. Several were already helping sibling and other family members based on what they had learned.

The graduates were proud of what they had done as well. They were asked if they felt they had accomplished much during the multimedia program. Some of their replies were:

> "…I finished up a web page for my uncle… He's an artist…"
>
> "…Learned a lot of new programs that are needed right now, that're in demand, in use, that'll hopefully help me get a job."

> "I know like in Language Arts class, all the stuff I learned in there the school is starting to teach us now. I'm like wow, I know this stuff already…"

Perceived Self-Efficacy And Attitude Questionnaire (PSE&A)

For this study, the first (n=99) and third (n=66) questionnaires administrated were used. An Alpha (Cronbach) model of internal consistency was performed to determine overall reliability. Overall reliability of the questionnaire was .84 (pretest) and .85 (posttest). (See Appendix B)

Perceived Self-Efficacy

Perceived self-efficacy is defined as a person's judgments about their ability to succeed at a task without assistance (Bandura, 1986, 1993). Some research findings indicate that students with more positive perceptions of their ability to succeed on a task persist in that task longer (Butkowsky & Willows, 1980), are more accurate in their judgments of their ability in writing (McCarty, Meier & Rindere, 1985) and, with strategy instruction, increase their perceptions of their ability to succeed in reading (McCarthy, Meier & Rinderer, 1985, Marsh & Penn, 1986, Parris & Oka, 1986, Schunk & Rice, 1987).

The perceived self-efficacy items in the questionnaire covered a variety of activities in literacy, art, technology, and design, as well as social abilities such as collaboration and communication. We sought to determine the students' perceptions of their own abilities in the indicated areas. Students were asked to respond on a 5-point scale, 5 being the most positive score to questions such as: To what extent could you write a letter to a friend using a computer?

A one-way analysis of variance was performed on each item. T-tests showed significant differences between pre- and post tests in several areas. Related to literacy, students felt that they could do the following activities more readily- reading a story (t (163) = 2.047, p=.042), writing a letter (t (163) =3.305.p=.001), reading something they liked (t (163) = 3.537, p=.001), and follow instructions for household appliances (t (163) = 2.271, p=.024). In terms of technology, students felt that they were more able to use a new tool after their MAEP experience (t (163) = 2.911, p=.042). In terms of design they felt more able to build something (t (163) = 2.145, p=.033), draw a picture of something in their neighborhood (t (163) = 23.166, p=.032), or design a logo (t (163) = 2.270, p=.007). In terms of their social abilities, they reported that they were more comfortable with sharing their ideas with a group (t (163) = 1.981, p=.008). The overall change was also significant (t (163) = 2.988, p=.003). (See Table 1, Appendix H)

These data indicate that students felt more able to use basic literacy skills, more confident of their ability to learn to use a new technology tool, to design or build something and to share ideas in a group after they had participated in the program for a year. The change reported on these questionnaires in these areas was significant statistically. There were many other areas of improvement in perceived self-efficacy and attitude that were not statistically significant.

Since research may support the idea that more positive perceptions of self-efficacy are related to persistence behavior and accurate appraisal of ability (Bandura, 1993), the findings in this area are encouraging in that their appraisal related to skills used to complete arts related projects. Although there were many statistically significant improvements, there were no like improvements of efficacy on items that were solely arts related. This is an intriguing finding as all the students were involved in creating arts related projects. Perhaps students saw the question (To what extent could you make art?) as nonsensical since what they had been making were not "art" objects to them, but

designed and created with new sensitivities that would otherwise be called "art." Perhaps the arts aspects were so embedded in the experience that they weren't particularly noticed.

Students had more positive perceptions of their abilities to use the skills needed to accomplish their arts related activities (i.e., literacy, technology, and design, as well as social abilities such as collaboration and communication) by the second questionnaire administration than they had toward begin able to do art.

Attitudes

Another group of items on the questionnaire dealt with students' attitudes regarding work, school, art, community, and the program as well as social abilities such as collaboration and communication. These were important indicators of one of the program's basic missions, which was to help young people to become productive citizens. As part of the formative study these data were important to making adjustments as the program grew. Students were asked to respond to questions on a 4-point scale, 4 being the most positive score.

Attitudes of the students towards work, school, art, and community remained stable over time, as did their appreciation of social abilities such as collaboration and communication. Interestingly, the one item that was statistically significance dealt with the concept of hard work equaling success. Students were more likely to agree with the statement, "Job success depends on how hard you work" by the second questionnaire administration ($F_{(1, 157)}$ 4.908, $p < .05$). Conceivably, working hard at arts related projects and being successful as a result of this hard work affected student thinking regarding the relationship between hard work and success. With the exception of this one item, there were no statistically significant changes in attitudes between the first and second questionnaire administration.

Literacy Skills

The traditional literacy skills portion of the PSE&A questionnaire was primarily diagnostic. That is, to see whether they could carry out literacy tasks so important to their success in school and work. The artist/teachers accommodated a diverse population of students. Many of the students had difficulty due their being English language learners whose first language was Spanish. There were two or three individuals each year that needed translation of class materials and instruction. About the same number struggled with normal text-based tasks. We discovered that our instrument made some erroneous assumptions, for example, on the alphabetize-the-cities exercise there were youngsters who had never been out of Tucson and so didn't do very well. The students reported in the follow up interviews that the Language Arts lab had had the most direct benefit on their school career.

The artifacts that were produced in many different media and the ease with which the program graduates discussed multimedia concepts and skills showed that these students had learned certain "new literacies" as well as learning to read and write better. Many of them had become quite proficient with a new set of tools. Through experiential learning and modeling by the artist-teachers, they became adept at using computer applications to design and create objects, such as calendars, booklets, videotapes animations and electronic portfolios, they were able to envision using these tools in school and at home, and they had some first hand knowledge of what it would be like to use them in a career.

Art Experience

Students were asked about the frequency of their participation in arts related activities by circling either yes or no for each question.

Example: Have you been to see a play in the last month?

There were many high affirmative responses to these queries. There were few changes over time in the responses to the questions on frequency of participation in arts related activities or types of arts related activities. In fact, the experiences were amazingly consistent from the first to second questionnaire administration. Important to note, however, is that some variables initially received already high yes responses. The items below received a high incident of "yes" responses (70-96%) at each administration of the questionnaire.

Have you listen to the radio in the last week? (96% posttest)

Have you drawn a picture in the last month? (86% posttest)

Have you written a letter in the past month? (56% posttest)

Have you seen a movie this week? (74% posttest)

Have you ever performed in a play? (70% posttest)

Students came to the program with a high degree of participation in arts-related activities. The questionnaires showed that they were not particularly influenced to participate in arts related activities as a consequence of their involvement in the project, or they were, again, not associating the project experiences with the arts at all, thus obviating any association between the project and the arts.

MAEP came from a school-to-work tradition at the arts council. Part of the initial funding was tied to giving youth experience and work place skills training. Being in a work place was a key to this approach. We found through the interviews and observations that its various participants viewed the culture of MAEP as part school, part art technology business, and part tutoring class, part computer lab, part art gallery, and part office space. Sometimes those identities conflicted, but often they were integrated and allowed students to learn from individuals both directly and peripherally engaged with the MAEP in a variety of settings from the aesthetic to the business of art side.

Longitudinal Study Findings

The study looked at students' success in high school, the impact of the program on extended families, and the impact of the program on students' college and/or career goals. Our only means of gathering this information was to query the graduates and this was difficult as they proved to be quite mobile.

A cohort of 29 students who started the program in 1997 (of 58 students who completed their first semester) graduated from MAEP in 1998 and 1999. They had earned their own computer through MAEP and went on to high school knowing how to use it. Efforts to maintain contact with these students during their high school career allowed us to ascertain that of that 29, eight were not reachable at the time they would have been eligible to graduate (2002). We were able to verify by phone and some records checking at local high schools that 20 had graduated or were going to graduate shortly from high school. One young lady was just shy of enough credits, pregnant and forced to postpone her high school career. We heard of no one dropping out of school, although several families moved away and we lost contact. That is not a bad outcome in terms of the drop out rate for this segment of the population. In 2004 nine were attending the local University or the Community College.

Typical comments from the graduates included:

Sam B.: "I'm getting my Associate of Arts degree at PCC this semester and hope to go to college in California. The program was great for general knowledge, especially writing skills."

Scott W.: In computer engineering at PCC. "The program helped a lot in high school." Planning to apply to college.

Veronica and Maria A.: Both graduated from high school this year. "The program was good."

Esteban S.: "I'll graduate from high school this year. I'm not sure what's next, but something in graphic design or something in computers…"

George G.: Working as a housepainter. "The program helped me understand color and texture."

David B.'s mother: "He enjoyed it. He's currently at the U of A in Civil Engineering, working at Sears. Learning computers helped."

Graduates reported that the tools they learned to use in MAEP were useful to them in high school. Several credited the computer with helping them get better grades. Others used their computer skills in extracurricular activities and at work. In the exit interview conducted when they graduated from the program they reported that the Language Arts lab was the most useful. At the later follow-up interview, their understandings had changed, and while they still felt that the Language Arts lab was valuable, they had found places to apply the other skills they had learned. They reported using their graphic arts skills to advertise for the school store, videotape school events, set up a web site for a relative, or create invitations for a quinciñera (coming out into society) celebration.

MAEP activities involved many kinds of literacy and literacy tools. MAEP students used many sign systems. They learned to transmediate by incorporating the words of a poem onto an illustration, for example, or by animating drawn characters from a storyboard. The word processing and desktop publishing supported skills they were learning in English classes at school (much needed by many of the ESL students). The computers, which they easily learned to use, allowed them to manipulate language and media. The instruction and critique emphasized basic grammar and composition as well as design and aesthetics. In a way it was a review for school, but the output was computer-mediated and the process was creative and artistic, and student centered. Students were asked to keep reflective journals and sketchbooks in each lab. They wrote proposals and progress reports for their independent projects. In the computer graphics lab students arranged blocks of text and images, and in the animation lab they created storyboards and characters. Video activities involved collaborative ensemble work shooting and editing. Students wrote treatments and proposals as well as scripts, and used the computer-based special effects system to make on screen titles. In the fifth semester students revisited earlier projects from the other labs and produced a portfolio. As mentioned above, when they completed the program they each received a PC and printer for their own use.

The MAEP experience included activity and discourse specific to several arts disciplines, many new tools, and arts workplace environments. Literacy was part of each lab's activities: reading the directions, solving problems with the help menu, finding control labels for digital brushes and motion software, and so on. To use most modern electronic tools it is necessary to read menus, instructions and help dialogues. Students deliberately grappled with problems of design and presentation in all dimensions, they produced poems, logos, animated models and video.

The influences of the MAEP participants' home, school and community were reciprocal and changing. In a similar spiral of learning, from idea to tool and back (Salomon, 1990), acts and ideas were engaged with new skills in new media. These new skills called forth new ideas and the transmediation of those ideas into alternate modes or media. The infusion of technology into the

students' lives and into their families' lives had an effect that ricocheted among several domains, including school.

The 1999 graduates of the multimedia program, about to enter high school, reported that they had little opportunity in school to show what they had learned about the very sophisticated art technology. They reported that school computer use was generally limited and did not include the kinds of activities that were part of the multimedia program. This is confirmed by report of middle and high school teachers, some of whom did make sure that the highly skilled graduates of the program were eventually put to work on new projects.

MAEP Activity System

MAEP was a learning activity that evolved over time, adjusting to meet the changing needs and abilities of each cohort of students and each new technological affordance that became available. This dynamic aspect of the program lent itself to analysis through CHAT, based on the understanding that human interactions change and evolve over time as conditions in the activity setting are changed.

Activity is hierarchical, in the course of their activities in the setting described, MAEP students engaged in operations, which were both mental [learning new software] and behavioral [drawing]. As operations became automatic, actions were possible such as designing and creating more and more complex objects. The individual and group goals and objectives became more elaborate and, in turn, changed the nature of the setting. The object of the activity system is dialogic. Long-time goals are constantly being redefined through the collective activity. MAEP students brought ideas with them and learned to manipulate those ideas with new tools. The result was that their ideas changed. In this interaction between subject and object, the participant and his or her goals and objects were dynamic and in a dialogue related changes in the way a mediational tool is regarded.

Activities, in turn are made up of actions and operations (See Table 1, below). Activities are motivated toward an object or desired outcome. The graphics lab, with six computers and 8 students, was itself an activity system. (Each student interacting with the computer and its software can also be viewed as an activity system.) For example, the activity's outcome may have been the creation of graphic designs. Actions are oriented more specifically toward the goal. The action involved may be the use of Adobe Photoshop™ on a computer. Operations may be automatic or routinized to a degree. The operation in our example might be the subject's interaction with the mouse and keyboard.

Student	Activity	Action	Operation
	MAEP	Five labs	Software, exercises
		Work stations	Interface tools, materials
Graphics Lab		Class	Critique
		Design	Photoshop, Graphic arts & design
Photoshop™		Create design	PS tools
		Production	Mouse, scanner Printing tools

Table 1. Activity, Action and Operation at MAEP

This analysis focuses on the program itself, from the point of view of the students primarily, their parents or guardians, and the staff. The nodes that Engström (1978) described (see Figure One, p. 6) identify salient components of the setting. Each node then represents a potential source of contradiction or conflict. Development or movement through time can be described in the tensions and resolutions that are a part of human interactivity. The young chafe at the conventions they find and are strongly driven to invent their own in many ways. These conflicts change or are resolved as the system, and its individuals, moves through time and thereby account for the development of the program or the individual participant.

Table 2, below, describes the MAEP activity system for three groups of subjects: the students, their parents, and the teaching assistants (TAs) from the university. Each point of view is unique, yet they share one, or many activity systems. Each subject had his or her own goals or objects; each used a different set of tools, had different rules and roles available to them; each contributed to the culture of the labs and each experienced different outcomes.

Subject	Participants	Parents	TAs
Object	Computers and arts. Please parents. Learn new art technology skills.	Digital equity issues. After school activities.	As researchers doing participatory observation
Tools	MAEP, labs SW, Design exp, language Arts	Automobiles	Email reports, new computer programs
Rules	MAEP rules set and negotiated over School/Work	Policies about attendance, completion.	Research reports and meetings. MAEP culture and rules
Culture	Created new space from several different schools	Tucson, Hispanic.	University students. Academic goals
Roles/ division of labor	Students, artists, workers	Parents, logistical and moral support	Students, researchers, teachers, learners
Outcomes	New literacies, higher education	High school success for their child. PC in home	Teaching and curriculum experience

Table 2. MAEP Activity System

Subjects

One can look at MAEP from the points of view of three groups of subjects, stakeholders who participated to the greatest degree: the students, their parents, and the teaching assistants from the university who observed the cohort year of curriculum development. Each had an object or goal for participation. The students were interested in learning about computers and art. Many expressed this in their survey questionnaires and interviews. They were also pleasing their parents in many

cases by their participation. They developed a social network and from that gained some identity with the place. They saw that their new literacies were translating to school literacies.

Parents were involved because they saw it as a way for their child to take advantage of a learning opportunity. One father talked about how he felt that a "seed had been planted" with his son. He perhaps expressed parents' objects or goals for MAEP. Parents looked to their children to put the new skills learned to good use. Several parents mentioned the importance of learning to follow through on a commitment. It was not unusual for students to be conflicted by the great number of choices they had about how to spend their time and energy after school. Some parents expressed their interest in digital equity issues, feeling that this was an opportunity to make their family more competitive. Importantly for parents, MAEP was a safe after school activity and its reputation was fairly solid among many extended families and neighborhood relations.

The teaching assistants were learning to be researchers while helping to support their education. Some were motivated to take advantage of the opportunity to be involved in an art technology setting; others wanted to become teachers themselves. They were accountable for weekly reports and for meetings with the Principal Investigator and were involved with the MAEP teaching team.

Objects

Actions have an objectified goal. They were carried out for particular purposes or motives. Students wanted to create a design, to animate a character they created, or to videotape a story they had written. As they learned more about art and technology, their goal expanded to learn new computer skills. Their motives may have been to please their parents, earn money, or get their own computer. One salient goal for the students was the personal computer that would be theirs to take home when they graduated. The object is transformed through work into an outcome.

Tools

Students in the program found mediating tools at many levels. MAEP itself was helping them engage in learning and find identity in practice. By learning new vocabulary from discussions of aesthetics and the elements of design, students were better able to express themselves and their new ideas. The software mediated their ideas and designs as they developed new ways to apply their ideas, then revisiting them with new multimedia and conceptual tools every few months. Each lab had an operational outcome that required and rewarded engagement. The duration of the program (five semesters) meant that the students grew physically and developed mentally and emotionally. Therefore they were able to reengage the various tools with new abilities and sensitivities.

Many students reported that their work in the Language Arts lab had been very useful in their school classes, especially English and Language Arts. Since many of these students were from Spanish speaking homes this was very useful mediation. Others mentioned that they used their skills to support school projects like the bookstore and club. The mediating tool most used by the parents in this activity system was the automobile. Their commitment to transporting students was a mainstay as the program drew from five school districts in a large county.

Rules

The rules that were established at MAEP were both formal and informal. A handbook was eventually prepared for new students and their parents with explicit rules for attendance, deportment, and expectations for students that had been established over a few years experience.

These rules evolved from school models of acceptability combined with the staff expectations and consideration of the student and program needs. For example, critique of individual work was a regular technique. This required the students learn certain formalities, such as turn taking and always saying what they liked about a piece before criticizing it. This had an effect on the culture of the program as weekly lab presentations to the whole group were instituted and participants learned how to present their work and give consideration to the work of others.

There were also informal rules established that helped students from different schools and neighborhoods get along in the neutral turf of MAEP. These middle school students were often influenced by gang activity at their schools and neighborhoods. Occasionally some were tempted to bring these behaviors, signs, colors, threats, with them after school. Of course the staff was ready to step in, but by and large the students managed to override these influences among themselves.

Division of Labor/Roles

Participants in MAEP had a variety of roles available to them. While it was clear who the teachers were, the nature of the activity caused them to be learners at times as well. Students became teachers when they helped their fellow students, and sometimes their teachers, to solve problems in the arts technology space. They often collaborated in design and execution of projects sharing tasks on a rotating basis. From time to time they had to report out to the larger group on their labs' progress in the context of an art technology business model. They learned through practice how to behave like a multimedia artist at work.

Culture

MAEP was situated in a cultural context of the downtown area of the city. The labs shared a building with active arts council offices and a busy art gallery. The students came right from school and brought some of that culture, both the positive and negative influences, with them as they created another unique space for themselves. They brought favorite media icons and family images with them and used these in their projects, including the cartoon Tweety and the pop singer Selena, and many family photos. The language and discourse of MAEP was arts- and work-related and that made it different from home or school.

MAEP became a 3rd Space for students (Moje, et al, 2004), a place separate from home and school, where they were able to use knowledge and skills that they brought from both places. Works that they created at MAEP were related to both these other places, yet unique. New literacies that they gained at MAEP were carried back to their classrooms and into their homes and carried information between the cultures that traditionally defined students' lives.

Tensions

Human activity systems contain ambiguities and contradictions (Cole & Engström, 1993). There were tensions between groups and between individuals as in any large gathering. Tensions between rival schools from across the county and between neighborhood affinity groups sometimes were evident at MAEP. In arts education settings there are systemic tensions that arise between process and product, for example, or good art/bad art, or between aesthetics and technology. There is a need for both holistic and reductionist instruction (Nabar, et al, 2002), that is, the big picture of design and utilization had to be addressed as well as the minutiae of how to do it. At MAEP a tension existed between learning art and design concepts, on the one hand, and learning computer hardware and software applications on the other. Other tensions were found in the negotiation

between the rules and student, and between student behavior and their freedom of expression. Rules were informally negotiated to accommodate the need to make MAEP productive, yet, let it be at the same time different than school. The premise that the program would be able to continue to commit to new students and their parents that they would be getting a new computer in two years or so when the student graduated from the program was an important tension. Ultimately, as it turned out, the program could no longer be sustained.

Outcomes

An anticipated outcome of MAEP was to encourage new, multimodal, literacies to middle school students. The program was successful for many of the participants, certainly it was for those who completed the five semesters and received a computer along with skills to use it. According to Arts Council records, over 300 students completed one or more semesters. Over 100 students graduated from the program, presented their portfolio and received their computer. For the MAEP graduates, the sample cohort of students that we followed was clear that in stating that the program helped them in high school and influenced their plans for after graduation. These students reported that they were using their new skills in a variety of ways both in and outside of school. Arts Council reports showed that individuals who only completed a semester or two reported informally that they gained from the experience by having more confidence in their ability to learn to use a computer. Students learned to behave like designers, to be part of a design team, and to be accountable by their attendance and punctuality. They also had the experience of presenting their work for critique and revision.

Sadly, the program lost support, particularly for the computer purchases for each graduating class. The support within the Arts Council, a joint city/county operation, disappeared when the Executive Director who founded the program left for another job in another city and priorities changed. The new Board of Directors and new Executive Director did not choose to continue their support for arts education in the community at the same level. MAEP slowly wound down to finally close in July of 2002 with only three labs running and parents contributing to the purchase of computers. The equipment and software was dispersed, the positions were eliminated, and the arts council itself moved into much smaller quarters.

Future Research

Many possibilities exist for further research. For on, existing contact information may make it possible to continue to track the college careers of a number of program graduates from the original cohort. It might be interesting to hear from them how the earlier experience had made a difference, if any on their higher education and career choices.

The MAEP curriculum materials exist and could be repurposed to reflect new software tools available and implemented again in a setting with the tools and support for such a program. The integration of art and technology in learning environments has promise and should be explored more fully. Continued development of the CHAT framework for analysis is a part of several subsequent studies. The application of CHAT to designing learning environments is another area that may be worthwhile to explore.

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About the Author

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APPENDIX A. Parent Interview Questions

1. What do you think was the most important thing in _____'s participation in MAEP?
2. What did the program mean to you, as a parent? What did it cause you to have to deal with?
3. How is _____ doing at school?
4. Do you think _____ will graduate?
5. What kinds of plans does _____ have for after high school?
6. Do you think that MAEP helped with school? In what ways?
7. How much use has the computer gotten at home? (Brothers and sisters, others)
8. Who else uses the computer at home? (Do you user a computer?)
9. How did you find out about the program?
10. Have you recommended the program to anyone else?
11. Did you meet any of the other parents in the program?
12. How important was the educational incentive (stipend)?
13. Do you think that _____'s experience at MAEP has influenced some of the courses that s/he might choose in high school?
14. What other after school activities did _____participate in?
15. Do you know what kinds of software s/he used in the MAEP? 16. Did that filter up to you?
16. Do you feel that MAEP (had) (is going to have) an effect, one way of another, on his/her high school career?
17. What was your impression of the social culture <atmosphere> of the multimedia lab?
18. You've said a lot of good things about the program. Was there anything that was a problem?
19. Do you think it (taking a semester off) helped him with the program or hindered him with the program?

A. On a scale of one to ten, one being very little and ten being very much, how much did the multimedia program help your child with his/her self-esteem?

B. How much did the multimedia program help your child artistically?

C. How much did the multimedia program help your child with his/her writing skills?

D. How much did the multimedia program help your child learn responsibility?

E.   How much has this program influenced you/your family?

APPENDIX B. Perceived Self-Efficacy and Attitude Questionnaire (PSE&A)

TPAC Multimedia Arts Education Program Student Questionnaire

1.   Please answer these questions using complete sentences.

a.   What kinds of art do you like best? _____

b.   What do you like to read the most? _____

c.   What kind of writing do you like to do best?_____

d.   What kind of sports do you like best?_____

_____

2.   List 6 Arizona towns, then put them in alphabetical order.

        1._____   1. _____

        2._____   2. _____

        3._____   3. _____

        4._____   4. _____

        5._____   5. _____

        6._____   6. _____

_____

3.   Fix the poorly written paragraph below, underline problems (like misspellings or punctuation) that you see and make corrections. Write the number of changes you make in the space below.

> Until recently experts, recommended cutting across the bite and sucking out the venom. "Never cut a snake bite, Dr. Marez says. more dammage can be caused by the cut than by the bite. Other donts are: never apply ice to the bite area; do not give alocohol; and do not waste time catching the snake
>
>   [Number of corrections_____]

4.   In the space below, write about the last book or article you read. Tell why you liked it or didn't like it. Answer in complete sentences.   Please use your best English.

5.   In what order do these sentences belong in a paragraph? Please number them one through four on the lines to the left.

_____ Later, black Africans were brought to work as slaves- until slavery was ended in 1865.

_____ The first Americans were Indians, who traveled from Asia in prehistoric times.

_____ More recently, people from Asia and from Central and South America have moved to the U.S.

_____ Europeans began to arrive more than 400 years ago.

How do you feel about tasks that involve reading and writing, art, or computers? Please read and answer each question carefully. There are no right or wrong answers, only honest ones.   Answer each question by circling the number that best reflects your answer. Use this scale:

<div align="center">

I could not do it. 1.

I could do it with difficulty if I had help. 2.

I could do it easily if I had help. 3.

I could do it with difficulty on my own. 4.

I could do it easily on my own. 5.

</div>

6. To what extent could you read a story in a magazine or book?

7. To what extent could you write a letter to a friend using a computer?

8. To what extent could you use a new tool?

9. To what extent could you read an article or information about the work you like to do?

10. To what extent could you build something?

11. To what extent could you imagine a design for a house?

12. To what extent could you share your ideas with a group?

13. To what extent could you draw a picture of something in your neighborhood?

14. To what extent could you could you read the directions to put together some household equipment (such as a VCR)?

15. To what extent could you design a poster?

16. To what extent could you enjoy an art museum?

17. To what extent could you write a report about the kind of work you have been doing?

18. To what extent could you operate a camera?

19. To what extent could you enjoy an orchestra performance?

20. To what extent could you make art?

21. To what extent could you play a musical instrument?

22. To what extent could you learn to use a new computer program?

23. To what extent could you design a logo?

Please answer the questions below by checking yes or no.

24. Have you been to see a play in the last month?

25. Have you been to an art museum in the last month?

26. Have you listened to live music in the last month?

27. Have you listened to the radio this week?

28. Have you drawn a picture in the last month?

29. Have you written a letter in the past month?

30. Have you seen a movie this week?

31. Have you ever performed in a play?

32. Have you danced in the past week?

33. Have you performed music in public?

34. Have you noticed murals in your neighborhood?

35. Please write down how you think this TPAC Summer Arts job could help you?

For the next section use this scale:

- 1 -	-2-	-3-	-4-
(Strongly Disagree)	(Disagree)	(Agree)	(Strongly Agree)

36. I like to work in a group.

37. Job success depends on how hard you work.

38. Bosses are more important to my happiness than friends.

39. When I'm in a group, I share my ideas if there is a job to d

40. What the people in my neighborhood think matters to me.

41. Teamwork can be important in a work situation.

42. Cultural things, like art, theatre, music, dance, and language, are not a part of my neighborhood.

43. How much money I make is the most important thing to me.

44. I will stay in my neighborhood after I graduate.

45. To get a job, what you know is more important than who you know.

46. Things I learn in school will help me later in life.

47. I don't know most of the people who live in my neighborhood.

48. My number one job is to graduate from high school.

49. I'd rather be told what to do by an adult than by someone my own age.

50. I think it'll be very hard to find a good job.

51. I like to work alone.

52. I feel good about my neighborhood.

53. I am usually a leader in group projects.

54. The TPAC summer program can help me find a job.

55. Hard work is the best way to get ahead

56. I usually let other people make decisions and I just go along.

57. My career goals are: (Please use complete sentences)

APPENDIX C. Teacher Survey

UA/TPAC Multimedia Partnership Teacher Phone Interview

1. Do you know about the MAEC/TPAC program?

2. Where you aware that _____ was in the MAEC program (dates)?

3. What kind of a student was _____?

4. Did _____ have any particular skills that stand out?

5. Did _____have any particular deficits or problems that you remember?

6. Are there opportunities for students to do arts activities or projects in your class?

7. What opportunities are there for student computer use in your class?

8. What opportunities are there for student computer use in your school?

9. Did _____turn in handwritten work or word processed/typed work?

10. Would it be helpful to you to know when a student is in a program such as MAEP.

APPENDIX D. Graphics Lab Curriculum

Examples of Curriculum and Learning Objectives

Here is a sample of the week-by-week activities used in the Computer Graphics lab (Thanks to teacher Tim Hensley for permission to use this material):

WEEK 1: Week one will be an in depth overview of all rules, regulations and procedures for the fall semester. The first two days will be dedicated to classroom policy and behavior expectations. As an enthusiasm builder I will perform numerous demonstrations of the material that will be covered throughout the entire semester. By the end of the first week the children will be introduced to their first project (a personal logo). At this time the students will be asked to begin sketching and conceptually planning this logo.

WEEK 2: This week will be dedicated to the teaching and exploration of the conceptual design process. We will experiment and be assigned mini projects using cut paper and acrylic paint. These skill building projects will be an aid in the children understanding of the conceptual process which must begin long before the computer is used as a tool. At the end of this week the students will be assigned a weekend homework assignment of 50 thumbnails for their personal logo. This will give the children plenty of time to plan and sketch out their thoughts on this logo mark.

WEEK 3: At this time the students will be given a chance to scan and manipulate their hand done projects from the previous week. Adobe Photoshop will be the first program that they will be introduced to. As a means to ease them into this highly complex program, the children will interact in a series of lessons that will demand a progression of skills. At the end of this week the students will meet with me one-on-one to review the direction and progression of this mark.

WEEK 4: This week the children will produce their first digital photo manipulation. The original photo will be one that the child will choose to bring from home. They will demonstrate the knowledge and comprehension of the skills that were introduced the week before. At this time the students will be immersed in all the functions and effects of Photoshop and be given time to explore and master skills of their interest. The students will be asked to bring in on Monday, five tight almost complete drawings for their logo. At this time the students will be lectured on the critique process and its purposes.

WEEK 5: Monday of this week will start with the students engaging in their first design critique on their five tight thumbnails. Week five will be the Adobe Illustrator week. The students will be introduced to the functions and possible manipulations that this program makes possible. The emphasis on this program will be the many options of experimental typography and how it can be applied to their personal designs. The children will be taught this program so they can do any layout or word processing relative to their designs. The main functions that will be taught this week will be type manipulation, imagery tracing, and the incorporation of typography with imagery.

WEEK 6: This week will be the second week of Adobe Illustrator. The students will continue to explore more narrowed functions of this program. The students will be assigned a few mini projects that incorporate the last two programs that they have learned. The goal is that by the end of this week the students will have a firm enough grasp on the basics and specifics to begin with their series of design projects.

WEEK 7: This will be the first workweek of this semester. The students will be required to finish their personal logo by the end of this week. At this time the students will be introduced to the list of projects that they will have the option to complete by the end of the semester. The students who finish early can either begin sketching on their next assigned project or begin writing the contract for their first interdisciplinary self motivated project.

WEEK 8: Week eight will begin with the students first formal presentation and critique. At this time the students who have written contracts will begin working on their contracted project. The non-contracted students at this time will be introduced to their CD packaging project. This project will be conceptually planned on paper and submitted for my approval. The time line will be two weeks from start to finish on this project.

WEEK 9: This week will be a workweek. Non-contracted students will continue to progress on their CD cover while those contracted students carry on with their process. The contracted students will continue to work on their first project. The first contracted project will be given a two-week time line due to the experimentation of this new process.

WEEK 10: At this time the students will be introduced to their first identity project: o create a name, logo and identity work for a made up shoe company. This is a mandatory project to all non-contracted students. The promotional pieces for this project will include such things as b/w and color logos, business card, letter head, envelope package, color and b/w magazine adds, and two clothing article designs. At the end of this week the students will be given an assignment of 30 thumbnails about their identity project. The final critique on this identity project will be the Monday of week twelve.

WEEK 11: This will be a progress week for the students to work on their current projects. The Shoe Identity students will begin their logo work and complete it by the end of this week. At the end of this week the students will begin conceptualizing how this mark is going to be carried over into stationary kit.

WEEK 12: This week the shoe identity students will complete their stationary kit. By the end of this week the students will present their package to the class. The contracted children will continue working on their planned projects. Upon completion of their individual projects the contracted students will be required to present the contract to the class and the final project in one complete presentation. This will be done for critique purposes so the students can learn from each other's experiences.

WEEK 13: This week the student working on the shoe identity will have the option of creating a color magazine add or designing some type of packaging for their shoe identity. All contracted students will be required to present by the Tuesday the 15th of April. At the end of class (the 15th) the students will be briefed on their final poster project. This project will be mandatory for all students. The poster projects will a chance for the students to create an 11x17 full color poster of what ever they want. This project will include the design of the poster, the disk preparation, and the full digital output at a selected printer.

WEEK 14: All the students will continue to work on their final projects. The tentative goal for their posters will be Thursday the 24th of April.

WEEK 15: This week will be a catch up week. The students who have completed all projects at this time will prepare their digital portfolio. By the 7th of this week all students must have completed every project to receive their stipend and graduate to the next lab. At this time the students will be ready to graduate and begin their multi-million dollar design career.

Below are the learning objectives upon which these are based. Note that they follow a basic outline from Bloom's taxonomy (Thanks to Gulcan Ercetin for this working document):

Learning Objectives for the Computer Graphics Lab

The Cognitive Domain

Knowledge

Students will be able to:
1. Define and use basic technology vocabulary (e.g. internet, search engine, resolution, dpi, megabyte, PC, font etc.);
2. identify the components of a computer (e.g. keyboard, control keys, mouse etc.);
3. Identify functions of keyboard commands as well as naming them;
4. Define Graphic Design;
5. Identify main principles of graphic design (variation, repetition, alignment, proximity);
6. Name the tools used in Photoshop and Illustrator;
7. Select the appropriate tools;
8. Outline the procedures to use the tools;
9. Define 'critique' as an opportunity to share experiences and receive positive feedback;
10. Define Vector Art;
11. Identify elements of typography;

Comprehension

Students will be able to:

1. Distinguish between the four principles of graphic design;
2. Provide examples illustrating how these principles are realized in graphic design;
3. Demonstrate an understanding of graphic design as being a part of everyday life;
4. Defend the use of certain tools in designing an image;
5. Present the definition of computers as tools and explain what it means;
6. Demonstrate an understanding of the relationship between efficient drawing skills and creating designs on the computer;
7. Demonstrate an understanding of the purpose of a critique;
8. Explain the advantages of Vector Art;
9. Distinguish between Vector Art images and Photoshop images;
10. Demonstrate an understanding of the importance of typography in graphic design;

Application

Students will be able to:

1. Demonstrate efficient use of keyboard commands;
2. Operate peripheral devices, e.g. scanner;
3. Demonstrate efficient drawing skills;
4. Select and use appropriate tools to manipulate images;
5. Explore functions of tools in order to use them creatively;
6. Design images based on the principles of graphic design;
7. Use efficient search strategies to retrieve information and images from WWW;
8. Manipulate scanned images and images downloaded from WWW;
9. Acquire skills essential for Vector Art, e.g. placing and locking images, tracing shapes, arranging shapes etc.;
10. Design typography based on the principles of variation, repetition, alignment, proximity;

Analysis

Students will be able to:

1. Present work to audience;
2. Break down an image into its components (background, layers, selection, type etc.);
3. Incorporate principles of graphic design into their images;
4. Modify their work according to the feedback received from peers and the instructor;
5. Compile all the skills acquired throughout the semester for individual projects and group projects;

Synthesis

Student will be able to:

1. Judge the value of a piece of design work by use of both internal criteria and external standards;
2. Explain the place of graphic design in economy;

APPENDIX E. Student Follow Up Interview Protocol

1. When did you graduate from the TPAC Multimedia program?

2. What grade are you in school? What school?

3. What do you think of that program now?

4. How have you used what you learned at MAEC?

5. Do you get to use the computer skills you learned?

6. Do you get to use computers at all in school?

7. Do you use your computer at home much?

8. What kinds of things do you use your computer for?

9. Who else uses the computer?

10. Describe any computer jobs or projects started/completed.

11. Do you use the WWW?

12. Do you do any animation?

13. Do you do any graphics design?

14. Do you write poems or stories or keep a journal?

15. Do you do any video work?

16. Can you think of any specific things you learned in MAEC that   have helped you in school?

17. Do you work? What kind of job? Do you use computers?

18. What do you remember about the MAEC program?

19. What would have made it more useful to you?

20. Do you have contact with MAEC?

21. Do you have contact with any of your classmates from MAEC?

APPENDIX F. Student Graphics Samples
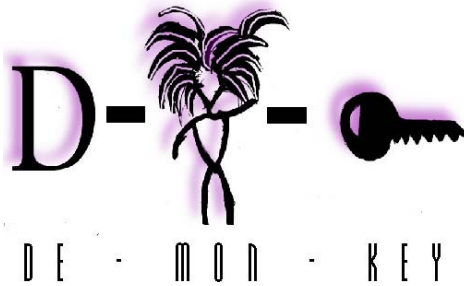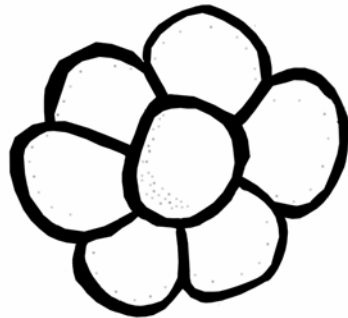
APPENDX G. Student Poetry and Prose Samples

1. Santos   The last coyote has to growl because it is
                   smashed between bananas and apples as gray
                   as my dad's old hats.

2. Topozio   I am the color green when I am
                   Happy about something I did
                   to make me happy. I am the color
                   red when I am very very mad
                   about something someone
                   told me. I am the color gray
                   when I am ready to work on
                   things. I am blue when I am
                   cool about something I did.

3. Emmanuel   *The Poem Inside Me*

                   The poem inside me wants to find the soft side of me
                   It looks like a fool on a corner
                   It was made in my mind
                   My story is about the way I seen my mom for the first time
                   It feels like a pretty flower
                   It imagines getting a computer.

4. Pantoum – Class poem 8/20

                   Listening to the radio
                   Cruising down the street
                   listening to the hardcore beat
                   Have my woman beside me

                   cruising down the street
                   her lipstick is so sweet
                   have my woman beside me
                   looking for something to eat

                   Her lipstick is so sweet
                   tastes so fruity
                   looking for something to eat
                   taking her to Furr's cause that's all I can afford for her to eat
                   tastes so fruity
                   listening to the radio

taking her to Furr's cause that's all I can afford for her to eat
listening to the hardcore beat

Appendix H. Statistically Significant PSEA change items

Literacy
PSE #6-read a story   Pre: N=99, M 4.3917, SD .9747   Post: N=66, M 4.6876, SD .8014   t (163) = 2.047, p=.042   F 9.791, p=.002
PSE #7-write letter   Pre: N=99, M 4.3299, SD 1.0274   Post: N=66, M 4.7812, SD .5105   t (163) = 3.305, p=.001   F 29.221, p=.000
PSE #9-read about something you like   Pre: N=99, M 4.1460, SD 1.0593   Post: N=66, M 4.6564, SD .6132   t (163) = 3.537, p=.001   F 24.389, p=.000
PSE #14-read directions to put together household equipment   Pre: N=99, M 3.5259, SD 1.2462   Post: N=66, M 3.9394, SD .9747   t (163) = 2.271, p=.024   F 6.975, p=.009
Technology
PSE #8-use a new tool   Pre: N=99, M 3.5216, SD .9947   Post: N=66, M 3.9530, SD .8307   t (163) = 2.911, p=.042   F 4.546, p=.034
Design
PSE #10-build something   Pre: N=99, M 3.6734, SD .9977   Post: N=66, M 4.0000, SD .8944   t (163) = 2.145, p=.033   F 2.515, p=.115
PSE #13-draw a picture of something in neighborhood   Pre: N=99, M 4.0309, SD 1.0828   Post: N=66, M 4.3788, SD .8904   t (163) = 2.166, p=.032   F 2.576, p=.110
PSE #15-design a poster   Pre: N=99, M 4.0721, SD 1.0326   Post: N=66, M 4.4091, SD .8408   t (163) = 2.207, p=.029   F 1.738, p=.189
PSE #23-design a logo   Pre: N=99, M 4.0000, SD 1.0880   Post: N=66, M 4.4308, SD .8407   t (163) = 2.720, p=.007   F .075, p=.784
Social Abilities
PSE #12-share ideas in a group   Pre: N=99, M 3.9182, SD 1.2831   Post: N=66, M 4.2879, SD .9886   t (163) = 1.981, p=.049   F 7.254, p=.008

Overall
PSE overall Pre: N=99, M 3.9476, SD .6199 Post: N=66, M 4.2296, SD .5521 t (163) = 2.988, p=.003   F .411, p=.522

Table 1. Statistically Significant PSEA change items

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