
**Critical Fusion—Technology and Equity in Secondary Education**

PETER MAGOLDA

*Miami University*

*Oxford, OH USA*

magoldpm@muohio.edu

This manuscript reports on the first year of a formative, external program evaluation of the Critical Fusion Initiative (CFI), which involved a higher education institution, a public high school, a corporation, and two nonprofit organizations. The initiative fused technology and education to address the issue of equity by assisting 16 inner-city 11th grade high school students to create an Internet website that documented Cincinnati Ohio’s involvement in the Underground Railroad. The analysis provides insights into advantages of lessening the digital divide, offers glimpses into pedagogical challenges associated with implementing a technology curriculum, and describes students’ learning outcomes.

This manuscript reports on the first year of a formative, external program evaluation of the Critical Fusion Initiative (hereafter referred to as the CFI). The primary purpose of this collaborative initiative was for a higher education institution, a public high school, a corporation, and two nonprofit organizations to fuse technology and education to address the issue of equity by assisting 16 inner-city 11th grade high school students to create an Internet website that documents Cincinnati Ohio’s involvement in the Underground Railroad.
The “First Stop to Freedom” (the students’ title for their website) was the first collaborative venture involving the aforementioned agencies. It was the first interactive website of its kind to be created by 16- and 17-year-old students as part of their high school curriculum. And it was the first website to exclusively focus on Cincinnati’s role in the Underground Railroad. However, the CFI was not simply about firsts, it was also about freedom. The CFI was a first stop to freedom for high school students who have been metaphorically shackled because of limited access to the computer technology in their schools and homes.

The six explicit goals of the CFI included: (a) lessening the digital divide; (b) enhancing research skills that provide students with opportunities to inquire about their own (as well as that of the City of Cincinnati’s) cultural heritage as it relates to the Underground Railroad; (c) modeling ways to fuse computer technology into a high school curriculum; (d) improving students’ computer literacy by introducing students to the Internet and web authoring software, and providing participants with the skills to create online publications; (e) creating a website of cultural and artistic importance; and (f) improving participants’ post-high school employment opportunities.

The narrative that follows provides insight into advantages of lessening the digital divide, offers glimpses into pedagogical challenges associated with implementing a technology curriculum, and describes students’ learning outcomes. Three overarching research questions are posed and answered: (a) How does the lack of access to computing seriously impact students’ career options? (b) What teaching practices worked? and (c) What did students learn?

SHOWTIME: THE CRITICAL FUSION INITIATIVE IN ACTION

The hustle and bustle of the Urban Center’s boardroom quells as the 1:00 p.m. start time for the Critical Fusion Initiative sneak preview nears. The two project directors hover around the podium. Students relocate from the nearby makeshift dining room to the boardroom. An hour earlier, the granting agency hosted a luncheon for CFI students. The meal (including a celebration cake which contained an edible photograph of the project participants), coupled with graduation gifts (including a compact disc, candy, and a t-shirt), signals to students the special nature of this event.
It is a full house. Sixty multi-ethnic parents, siblings, friends, and invited guests, en route to their seats, maneuver around television technicians who are aiming spotlights and cameras toward the front of the room. The 16 students stand in single file near the front of the room. Students’ attire—neatly pressed collared shirts for the men and dresses for women—is dramatically different than their usual school uniforms which consist of baggy jeans, tennis shoes, and casual shirts.

The likelihood of the event being broadcast on the 11:00 p.m. news both thrills and worries students. They employ various strategies to channel their nervous energy. One student glances at his note cards and silently mouths his presentation; another student sends hand signals to a family member. Students realize that it’s show time as the President of the Urban Center, a sponsor of the CFI, arrives at the podium.

We are delighted to welcome all of you—all of our corporate sponsors, all of our students, parents, staff, and all of the individuals who have really made this possible. This is an exciting partnership, a partnership that really began for us years ago….To all of the partners I extend my personal thanks. This has been a wonderful opportunity for us and a wonderful opportunity for our youth to show off the fine things that they learned.

Students stand proudly and stare straight ahead as the Urban Center President steps aside and two teachers take center stage. Ms. Johnson\(^1\) approaches the podium, clears her throat, then speaks out—“good afternoon.” In unison, the audience replies “good afternoon.” Ms. Johnson smiles, then immediately reads from her notes.

We too, are very proud….Each week these young people have remained excited about the project. They would say on Wednesday morning—’Are we going to the Urban Center today?’ and ‘Don’t forget Miss Johnson, are you coming over [to the Urban Center]?’\(^2\) It has been difficult for me to come over because I have over 200 other students, but each time I came over, I saw them engaged and excited about what they were doing. I am looking so forward to seeing their final projects….I want to thank the parents…and the staff people at the University. This could not be done without the people here every Wednesday.
The audience applauds as Ms. Johnson steps aside and Ms. Bloom steps up to the microphone. Ms. Bloom smiles at her students, and then begins to read her prepared comments.

When I was first approached about my students and I joining in on this project, I was excited and apprehensive. I was excited because I knew it was a great opportunity for my students—creating web pages, using the Internet, and conducting research. They are all vital skills that look good on a resume. However, I was fearful that students would find out a little secret that I had been hiding. The secret was that I, too, was a student learning right along side of them.

Ms. Bloom’s confession elicits chuckles from students. Prior to this project, Ms. Bloom used computers only for word processing; as did most of her students. Months later, after witnessing her students surfing the Net for research information, scanning documents and uploading them onto their web pages, she better understands the power and potential of technology in educational settings, as do her students. Ms. Bloom oozes with pride as she speaks of her students acquiring these skills. She predicts that her students will continue to enhance their computer skills since most students plan to attend college. Her quick quip—“At least that is what they tell me”—invokes laughter. Ms. Bloom’s comments also remind the audience that the CFI is not simply about computer training. The project invites participants to learn about the past and use this history to educate future generations. She elaborates:

Before this project, I thought I knew a lot about the Underground Railroad. Not being a native of Cincinnati, I never realized how big a part Cincinnati played in providing a vital route to runaway slaves….During one of our trips to the University, we met a photographer who showed us many photos he had taken of houses with hidden passages, some actually located near the University. He was kind enough to allow students to use some of his photos on their web pages….I know the students are proud to show off their web pages knowing they will be used to educate millions about Cincinnati’s ties to the Underground Railroad.

A representative from the other nonprofit organizational sponsor, echoes Ms. Johnson’s and Ms. Bloom’s assessments about the value of the CFI. Two representatives from the granting agency offer their reflections on the
The first talks about the months of planning leading up to awarding of the grant. She reveals how easy it was for her to sell this program to her colleagues, including those who did not fully understand the concept of online publishing. Fortunately, her colleagues recognized the importance of providing genuine educational opportunities to inner-city youth. The second representative characterizes his involvement as a “labor of love.” He continues, “I know it sounds corny but spending every Wednesday together for a year, you form a bond that I hope will last for a long time.” Students’ heads nodding in unison convey that they concur.

The appearance of project codirectors at the podium warns the students that the heart of the sneak preview—their presentations—is imminent. Professor Dover briefly explains the purpose of this gathering and thanks the audience for attending. Attendees learn that the website represents 20 weeks of work and over 50 hours work on the part of each student. Professor Dover explicitly acknowledges an age-old problem with educational technology in secondary education—wiring high schools but then not knowing what to do with this technology once equipment and networks are installed. He argues that the CFI is a viable response to this dilemma. Professor Koch dovetails her colleague’s comments by detailing the academic intentions and implementation strategies of the CFI:

Professor Dover and I use a method for teaching technology within a discipline. You select a discipline, teach technology, and apply imagination. That is what you are going to see today. The first challenge for students was to take this huge topic and break it down into doable portions. We met for several weeks in the beginning to discuss the architecture of the site and discuss research methods. These topics were new to a lot of students. They did an outstanding job. Devising a plan was important….We went to the library twice to gather letters, newspaper accounts, diaries, books, etchings, woodcuts, drawing, and photos. You will see the results of students’ works as we view the site. Once the materials were in hand, the writing process began. At the same time, students learned hypertext language (html), that allows us to design websites. Their first task was to design a personal resume and biography and mark it up in html. Later, students learned to scan photographs and link them to web documents.

The project directors concluded their introductory comments by dimming
the lights and introducing the first pair of students. The “First Stop to Freedom” home page is projected on the screen in the front of the room as Marcus, dressed in a white starched shirt, tie, and suspenders and Damon, equally dapper, donning a white collar-less shirt and sleeveless plaid sweater, address the audience:

Hello, my name is Marcus. Damon, my partner, and I did the web portion on Politics and Religion, which we named *Praise and Politics*. Overall, the sources we worked with were very educational. We used documents that taught us about Cincinnati during the days of the Civil War and Underground Railroad. Riots sparked shortly after Cincinnati began to overflow with runaway slaves. Churches were destroyed such as the Allen Temple that was burned down three times. Laws were passed from the local government that kept freed slaves from keeping their status and countless runaways from achieving their dream of freedom.

Damon chimes in:

We learned how to find historical documents that brought light to the world that we only learned about in school. We were educated on the existence of the small villages, of Little Africa and Bucktown. An Internet website can be difficult to create and learning how to code our own integrated documents in order to prepare them for the Internet was also challenging.

Attendees divide their time between listening to students and studying the web pages that are projected onto the screen. As Marcus resumes speaking, his online biography appears on the screen that read: “Marcus has his head on straight and has found a direction that he is going to take. His future plans are to go to college and become a motivational speaker.”

Damon follows with an appraisal of the project, stating that the University visit was the highlight of the yearlong project. He quickly amends his appraisal, “In my opinion the second best part was the food,” which elicits howls from all. Marcus thanks the staff for “hovering over our shoulders with watchful guidance because it helped us put together another piece of the puzzle that is our American heritage.”

The second pair also uses a tag-team presentation approach. Vera begins;
“Hello, my name is Vera.” Her partner follows; “And my name is Keela. Our portion of the web dealt with the economics of slavery, which we renamed as Hard Work, Little Money.” Vera continues, “Cincinnati could have made a fortune with the arrival of escaped slaves, but all they could worry about were their jobs and safety. Many Blacks came to Cincinnati with little to no skills, but they remembered their tribe jobs such as blacksmiths and boatmen.” These students explain that shortly after residents realized a large number of escaped slaves were migrating to Cincinnati, city leaders passed a number of laws that disadvantaged fleeing slaves. Attendees learned that most of the escaped slaves kept on moving through Ohio until they reached Canada. Coincidently, the title of Vera and Keela’s web page applies to CFI colleagues as well. They, too, worked hard for little money. Yet, the students, like their ancestors, realize that long-term gains outweigh short-term woes.

As their web pages shine brightly on the screen, Vera and Keela announce that their pages contain valuable information that their high school history books forgot to include—in particular Cincinnati’s role in the Underground Railroad. An audience member calls out, “Amen.” Keela’s revised history lesson continues. She explains that Whites sabotaged several African-American-owned businesses in Cincinnati. Then she proudly declares, “Nevertheless, we still made it!…One thing I learned about history, to paraphrase James Baldwin: If you don’t know where you came from, then you don’t know where you are going.” Audience members respond to Keela’s commentary with vigorous applause and murmurs of Amen.

Although Keela’s comments reveal what she learned about the past, Vera’s remarks reveal what she learned to prepare for the future:

Our experiences in the field of web page designing were exciting to learn. …The Web is an awesome thing to learn and I feel that these professors and others who helped us gave us the skills and the determination to tackle those things, which we think are hard to do. One thing I’ve learned about the Web is that there are many ways to research. With the Web, research is faster and beneficial. Library research is one of the hardest things to do, but when you can narrow down your search, the Library is very effective. The research that my partner and I have done has primed us for college.

As Keela speaks, her online biography appears on the screen. A woman next
Saturday, March 15, 1998, I gave birth to a 5-pound, 9-ounce boy. I named him Tyree. As I spent the first night in the hospital with my son, I made a promise that I would be a perfect mother to him and his best friend. He is my pride and joy. I would do anything and give anything in the world for him. Therefore, I knew I had to finish school and go to college to set a good and positive example for him.

Keela’s (the only parent of the 16 participants) biography is a reminder of students’ complex lives and their desire to succeed, regardless of life circumstances. Vera’s salutation “Thanks for it all. You’ve helped make Keela and me college material,” suggests that with proper support, students can overcome life’s challenges and maximize educational opportunities.

Next, Lisa and Maria introduce each other and their topic of literature. Horrific images of slavery fill the screen as Maria talks about how she carefully researched Toni Morrison’s *Beloved*. Lisa remarks that participation in the project has honed her writing and editing skills and taught her the value of teamwork. Following their presentation, Lisa and Maria circle the room, proceed to the back of the student line, then quietly congratulate each other and their peers for a job well done as the next pair arrives at the podium.

Good afternoon ladies and gentleman, I’m Liz and this is Marcia. Our part of the website is personal accounts and the name of our page is *Written Expressions*. Our sites consist of narratives, diary entries, letters and a list of area conductors. Going through the different stories the emotion behind their writing was vividly strong. When I say *their* I mean the runaway slaves, conductors and any other supporters at that time. This page being shown right now is the introduction to our site. It is basically our summary of our web page. Our next feature page is *The Narrative of Levi Coffin*, which is an excerpt from the book Coffin’s *Reminiscences*. In his narrative he describes in detail his activities as a conductor for the Underground Railroad. After the success of his Cincinnati station he set up others in Newport and Indiana.

Marcia got one of the biggest laughs of the afternoon when she confesses that as a result of this project she finally put to rest her childhood theory that the Underground Railroad was a train that ran below the ground. The fruits
of students’ yearlong labors are obvious when Marcia announces that she, along with two other CFI students, will work as summer interns for the granting agency. Erin and Ann presented their research on spoken expressions. Erin offers an overview:

In our project we recounted the personal testimonies of fugitive slaves and their families who used the Ohio Underground Railroad. We want to give readers a firsthand look at the humiliation, pain, and suffering these brave people endured, and how Cincinnati served as a gateway to their new lives.

This aim is accomplished thanks to the gut-wrenching visuals, ugly reminders of one of American’s darkest historical periods. The team plays a sound clip—a fugitive slave speaking about his experiences—from their web page.

Paul and Hal’s presentation focuses on art, music, and poetry that showcases their newly acquired high-tech skills such as using search engines for research purposes, designing web pages using html, and scanning, as well as their old-fashioned skills, such as library research. Paul describes a positive unexpected outcome of the project—students’ ability “to see what college life is about.” Nel and Samantha then explain how African Americans entertained themselves through clubs, organizations, and their churches. Nel’s mini-history lesson and her assessment of what she and her partner learned (i.e., writing, editing, researching, and teamwork) reinforce their peers’ testimonials.

During the final presentation—Mapping the Way—Nina and Maddy explicitly convey the purpose of their presentation—to teach people the history that was once hidden. Nina focuses her comments on the technology, teamwork, and the project’s legacy:

With the Web, we learned that you can get useful information with just the touch of a few buttons. Researching was probably the hardest obstacle that we faced. This information could not be handed to us. We literally had to dig for clues and follow leads of sources. This experience taught us teamwork, which is critical for everyday life. We learned responsibility and what it means to be 100% dedicated. We are proud to be the ones to build the foundation for students of the future, giving them opportunities that we had, and even more.
As the final two students depart from the podium, Professors Koch and Dover return to congratulate the students, thank staff and sponsors, and invite all attendees to a reception across the hall as news media staff scramble to catch the students for interviews.

EVALUATION OVERVIEW AND METHODOLOGY

Narrative Methodology

Whyte (1943) argued that there is no better way of enriching the readers’ understanding of what is happening than by telling stories. Stories such as this one CFI stories resonate and challenge readers’ knowing and connect the events, actors, the storyteller, and readers to each other. Two passages from Witherell and Noddings (1991) elaborated on these virtues of narrative:

…narrative involves not only a sequence of events, but also a storyteller and an intended audience. Narrative structure contributes to our understanding of the meaningfulness of everyday life. Like many writers on narrative, we acknowledge the central role that narrative structure plays in the formation of the self and in the construction, transmission, and transformation of cultures. (p. 3)

…The power of narrative and dialogue as contributors to reflective awareness in teachers and students is that they provide opportunities for deepened relations with others and serve as the springboards for ethical action. Understanding the narrative and contextual dimensions of human actors can lead to new insights, compassionate judgment, and a creation of shared knowledge and meaning that can inform professional practice. (p. 8)

The CFI narrative recounts a sequence of events (i.e., the cumulating experience of student participants), told from the vantage point of the external program evaluator, which provides readers a glimpse into the everyday lives of high school students and their struggles to achieve
educational equity. The CFI narrative helps readers understand themselves and others and reveal possibilities, which makes the narrative a potential springboard for action.

Thomas Barone, in the *Forward of Narrative Based Evaluation* (Harrison, 2002) argued that in the context of program evaluation, narrative is still finding its way:

> Those who pay attention to developments in the social sciences and humanities are familiar with a turn toward narrative in those fields. But despite its rise to prominence in those areas of scholarship, narrative storytelling still plays a rather insignificant role in the field of educational evaluation. (p. ix)

Barone encouraged narrative based evaluators to resist the highly desired and seldom achieved outcome of *documenting certainty* (i.e., tricking readers into accepting the text as the final verdict on the evaluation context). A more desirable goal is to “lure the reader into rethinking educational possibilities” (p. x).

At the root of this uneasiness is the issue of the subjectivity of narrative, believing it compromises the believability and credibility of the findings (Harrison, 2002). Riessman (as cited in Shafer, 1992) elaborates, “Subjectivity, of course, is deeply distrusted in mainstream social science, which values context-free laws and generalized explanations” (p. 5). An aim of the CFI narrative is to enrich understanding of others and ourselves; it is not intended to offer final verdicts or generalized explanations. As such, these narratives are not objective statements of the way things really are, but instead represent my constructions of the situation in which I found myself. Hopefully the richly described narratives will allow readers to construct their own understanding of the situation and lure them into rethinking educational possibilities.

**Evaluation Methods**

As the external program evaluator, I met monthly with the two project directors during the first year of this study. During these meetings I interviewed (Fontana & Frey, 2000; Krueger, 1994) CFI staff, exchanged
feedback, and refined the evaluation methodology. I visited and participant-observed (Angrosino & Mays de Perez, 2000; DeWalt & DeWalt, 2002) the weekly seminars seven times, dividing my time between observing classroom interactions and conducting informal individual/group interviews with students. Twice, I visited the high school to observe classroom dynamics, conduct four focus group meetings with students, and administer a satisfaction survey. I attended two of the daylong University-sponsored sessions and interviewed the granting agency staff. Finally, I examined documents (Hodder, 2000) including the original grant proposal, seminar syllabus, required text, seminar handouts, television and radio broadcast tapes related to the project, and internal correspondence.

I chronicled my daily activities and recorded my observations, participation, and interviews in a notebook. Later, I expanded these notes. Whenever permissible, I audiotaped formal interviews, which I eventually transcribed. Finally, I recorded personal experiences, impressions, ideas, problems, questions, and preliminary interpretations and hypotheses in a journal. Two steps were taken to ensure the credibility of my findings. After each interview, I summarized and shared my insights with respondents who verified the information’s accuracy. To check the credibility of the final report, the project codirectors read it and identified errors of fact and omission, which I corrected.

I analyzed the data using Glaser’s (1965) constant comparative method. This method joins coding and analysis to generate “a theory which is integrated, consistent, plausible, close to the data…The constant comparative method is concerned with generating and plausibility, suggesting (not provisional testing) many properties and hypotheses about a general phenomenon” (pp. 437-438). Glaser describes the four stages of this method as: comparing incidents applicable to each category, integrating categories and their properties, delimiting the theory, and writing a theory (p. 439). The fruits of this process are woven into this manuscript.

THEORETICAL ANALYSIS

This case study analysis includes three sections. In the first section I discuss the digital divide, concentrating on ways to lessen it. In part two I examine the CFI pedagogy, assessing its effectiveness. In the final section I identify and discuss student learning outcomes.
Lessening the Digital Divide

Long before the technology revolution began, Ellis (1973), wrote “Thinking about the computer’s role in education does not mean thinking about computers; it means thinking about education” (p. 42). Education is at the heart of the CFI, which promotes the use of technology in a low-income and economically distressed urban high school. The CFI architects strongly agree with Kennedy and Agron (1999) who noted “Schools are a logical place to provide technological access to the community, as well as to their students and teachers. But difficulty in finding the resources to acquire the equipment and infrastructure has left many districts on the wrong side of the digital divide” (p. 20). This is precisely the reason CFI codirectors initiated the project. A primary aim of this initiative was to lessen the digital divide, which Carvin (2000) referred to as the civil rights issue of the new millennium.

The proliferation of technology in schools, homes, and the workplace is undeniable; so too are the demographic realities of this digital divide. African-Americans and Latinos are lagging behind, and this divide becomes wider with each passing year. The socio-economics of the digital divide are equally disturbing. During the first year of the CFI, 65% of the school’s students participated in the Free and Reduced Lunch program, an indicator of students’ socio-economic status.

CFI participants were on the wrong side of the digital divide, which severely hampers their ability to compete with peers in more privileged schools. Specifically, 7 of the 16 student participants had access to computers at their homes; others accessed computers at their local library, high school, friends’ or relatives’ homes, or parents’ workplace. Lack of exposure to technology at home and in classrooms closes doors to students, leading, among other things, to lower paying jobs, job insecurity, and professional lives on the margins.

“When you live in the inner city, the technology deck is stacked against you” was one television story broadcast’s lead sentence about the CFI. No doubt the deck is stacked against CFI students. The CFI is a modest K-12 technology intervention aimed at unstacking the deck. The narrative also reveals modest achievements that are possible, even in a relatively short period of time. In particular the narrative explores how access to technology and innovative instruction can enhance students’ life chances, although it is too early to offer a summative evaluation of this criterion.
Collaboration is at the heart of the CFI accomplishments. Primary stakeholders (i.e., students, the high school teachers, university faculty, funding agency personnel, and the two nonprofit agency staffs) each had competing agendas and differing goals, yet worked collaboratively throughout the program to initiate change. Hooks (1994) noted that it is crucial for those interested in changing teaching practices to:

…talk to one another, collaborate in a discussion that crosses boundaries and creates a space for intervention. It is fashionable these days, when “difference” is a hot topic in progressive circles, to talk about … “border crossing,” but we often have no concrete examples of individuals who actually occupy different locations within structures, sharing ideas with one another, mapping out terrains of commonality, connection, and shared concern with teaching practices.” (p. 130)

The CFI exemplifies the collaborative process Hooks discusses. Stakeholders occupied different locations within interrelated structures (e.g., university, secondary school), exchanged ideas, mapped out terrains of commonality, forged connections, and shared mutual concerns about teaching, learning, and technology. The CFI brought together different cultures (e.g., corporate funding agency and nonprofit community agencies), who subscribed to different ideologies, and whose primary constituents varied. These diverse cultures shared the common belief that lessening the digital divide is a prerequisite to serious educational reform. The introductory comments at the start of the sneak preview reveal one reason this collaboration worked—the collaborators put the good of the students ahead of their own self-interests.

Professor Dover, in a media interview, noted, “Mutual cooperation between the University and corporate America and people who have been marginalized can work… It is not as difficult as people think. And in the long run, everyone in society benefits at every level.” Throughout the CFI, each stakeholder group made unique contributions, leading to mutual cooperation amongst diverse stakeholders.

Although collaborative partnerships is a cornerstone for lessening the digital divide, the CFI case study also reminds readers that the digital divide is not simply a “technology problem” that can be solved by teamwork. Digital divide “solutions” are more complex than working together to provide high quality software, hardware, and instruction. Micro technology deficiencies
(e.g., not having wired classrooms) are intertwined with macro social and economic issues (e.g., weak tax base to support city schools, low teacher pay, school buildings in disrepair, overcrowded classrooms, and violence). A cover story in a city newspaper summarizes some of the challenges CFI students and faculty encountered on a daily basis. D’Agostino (2000) wrote:

In Sandra Wetzel’s biology class, it’s 11:30, and everyone waits for the bell to ring. In one of the three cafeterias, it’s 5:40, and 200 students stream in for lunch. In the administrative offices, where Susan Taylor holds down four jobs, including teaching duties, it’s 8:50….Not a single one of…public clocks work. Frozen hands have kept the same time for the past two years.

While it seems time might have stopped here,…administrators, teachers, staff, students, and parents are hearing a loud tick-tock….When it rains, buckets are placed in classrooms, hallways and offices to catch water leaking through ceilings. Some parts of the building have been roped off to avoid crumbling walls and floors. Due to budget cuts, the school’s 1,800 students have no full-time counselor to help them apply to college…Time might be running out…but when none of the clocks work, its hard to know for sure. (p. 18)

As this news story suggests, it was “time” for faculty, students, and community members to address the school’s technology woes exacerbated by the dilapidated physical plant of the school and the reduced staff. The case study reminds readers that decisions at the district, state, and school-wide levels (e.g., budget cuts) are intertwined with and hamper efforts to lessen the digital divide.

CFI students examined the Underground Railroad through an interdisciplinary lens, focusing on, for example, the arts, religion, politics, racial identity, and economics. So, too, must change agents consider not only technology issues but larger socio-cultural issues such as race, ethnicity, culture, and economics. It is imperative for change agents to view the digital divide through an interdisciplinary lens taking into consideration, for example, politics, religion, economics, and the arts.

Social justice (i.e., remembering the poor and powerless slaves who were excluded from society and whose interests were ignored) was at the epicen-
ter of CFI students’ research efforts. For example, Paul and Hal, during their final presentation, reminded the audience that, “slaveholders in the South took every step possible to keep slaves ignorant and unable to communicate with one another. They feared the slaves would rebel or flee from slavery. Blacks were prevented from reading or writing. Even whites could be prosecuted if they taught a slave to read or write.” An aim of students was to bring the issue of social justice to the forefront of website viewers’ consciousness. Likewise, collaborators, interested in lessening the digital divide, must recognize the importance of tending to social justice issues, not simply assume an objective, technical posture.

The CFI case study also reminds readers that lessening the digital divide does not simply involve enhancing students’ technology needs—it means addressing teachers’ needs as well. The low level of technology literacy on the part of teachers was evident in Ms. Bloom’s confession during the website preview. She, like many of her able colleagues, was ill equipped to fuse education with technology. Further, she did not have time during the school day to adequately address socio-cultural issues. Baird (1984) identified issues that inservice training of teachers must address. They include possessing general knowledge about computers, hardware and software, computer operations, uses, and the limitations of computers. Faculty must not only enhance their technology skills, they must answer moral questions posed Knapp and Glenn (1996), such as: (a) What general role does and should technology play in the classroom? (b) What are the implications of using technology for me as a teacher? and (c) How will the use of technology help students learn?

The CFI case study suggests that scholars, practitioners, grant-awarding agencies and students interested in lessening the digital divide would be wise to recognize that lack of access to technology jeopardizes students’ life chances and that stakeholders should consider not only collaborative and technical aspects related to fusing education with technology such as adequate facilities and computers, but also moral and socio-political issues as well.

**PEDAGOGY**

Natriello (2001) noted that “content, form, and structure of the curriculum have an impact on how individual students engage with it and their ultimate
success in learning…we have learned that these same elements play a role in students’ use of technology-mediated learning and that the form of the technology itself conveys lessons, lessons some will learn more easily than others” (p. 262). This section focuses on the CFI pedagogy—in particular, content, form, and structure.

A Texas journalist visited a CFI seminar to learn more about the curriculum and pedagogy. Two weeks later, she wrote a letter to the granting agency. A portion of the letter read:

…the students were extremely focused and engaged in the class. As they streamed in from the bus, they took off coats and jackets and got right down to work with almost no chatter or distraction. Amazingly, this focus continued throughout the entire three-hour class as each team worked consistently on its projects. I sat down with each team to hear about what they were working on. Each group of two or three had a perfectly clear understanding of their piece of the larger Underground Railroad tableau and how it fit in. They were able to articulate how they had gone about their research, the roadblocks they had encountered, and what other avenues they planned to explore. In my experience, college students often have not reached this level of sophistication in their understanding of research.

Second, most teams exhibited complete confidence and interest about the processes needed to transform their research into products that would work as part of the website. I understand that many of them had little previous experience with computers. Yet, in only a few weeks, they exhibited complete ease in front of the screens. They also seemed to appreciate the challenge of writing lucidly and succinctly, and valued the help of the University student assistants….The students exhibited total commitment to the job at hand and excitement about the prospect of the completed site’s publishing on the web. They also seemed to own the importance of their work as a part of the larger effort for Cincinnati’s Underground Railroad Museum.

This letter affirms Nartriello’s conclusions—that content, form, and structure of the curriculum matter. As the Texas observer noted, the initiative linked technology to curricular goals, sound instructional practices and subject matter content.
Researchers from the Tomás Rivera Institute found that “exemplary [digital divide] projects focus on providing supplementary computer access and tutoring for young people…adequate staff training…and a unified vision shared by participating groups, and that vision is focused on children” (Trotter, 2001, p. 40). The CFI yearlong initiative heeded the advice of the Rivera Institute. Despite the nonnegotiable length of each seminar meeting (i.e., 2.5 hours per week) and number of meetings per week (i.e., one) students and the instructors established a rhythm for the individual class sessions and a rhythm for each semester. Each week, time was equally divided between the mini-lectures and hands-on work time. Throughout these sessions instructors would shift back and forth from lecture to work time. The initiative provided supplementary computer access and instruction for high school students, offered staff development opportunities (focusing on technology) for faculty, reached consensus about a vision of processes and outcomes shared by all sponsors, and placed students at the center of every aspect of the initiative.

The CFI was student-centered and deeply committed to personalized education. The development of the Underground Railroad website encouraged higher-order thinking and problem-solving skills through real-world tasks. Finally, the project empowered students to take control of their education. The CFI coordinators based the curriculum goals on sound instructional processes that integrated Underground Railroad subject matter.

Baxter Magolda’s (2001) scholarship focusing on optimal college teaching/learning environments offered a useful theoretical framework to understand and evaluate the CFI. Baxter Magolda found that optimal teaching/learning environments were based on three key assumptions. First, teachers believed that knowledge was complex and socially constructed. For example when conducting a web-based research assignment, faculty introduced students to multiple and conflicting interpretations about the Underground Railroad (e.g., diverse views about Cincinnati’s role in the Underground Railroad), leading to ambiguity and uncertainty. The instructor required students to choose from multiple alternatives and publish on the website their social construction of what they believed to be true. Treating knowledge as complex and socially constructed gave rise to Baxter Magolda’s second assumption—that self is central to knowledge construction. CFI faculty encouraged students to bring their own life experiences into the learning process. Faculty encouraged students to view themselves as creators of new knowledge, not simply as narrators of history. The third assumption is that
faculty and students act as equal partners in this business of mutually constructing meaning. CFI students and faculty worked side-by-side to achieve agreed upon aims.

These three assumptions, evident in the CFI case study, parallel and extend three of Baxter Magolda’s (1992) earlier principles for educational practice. The first principle, validating learners’ capacity to know, means acknowledging students’ capacity to hold a point of view, recognizing their current understandings, and supporting them in explaining their current views. The CFI instructors accepted students’ levels of expertise and modified the curriculum accordingly. This led to students viewing themselves as capable of learning and knowing, and heightening their investment in the initiative. The presentations at the website premiere showcased students’ investment. This validation invited students into the knowledge construction process, conveyed that their ideas were welcome, and offered respect that boosted their self-confidence.

Baxter Magolda’s second principle, situating learning in learners’ experience, means using students’ experiences, lives, and current knowledge as a starting point for learning. The decision to have students begin the writing process by constructing resumes and biographies is an example of this principle in action. Students’ knowledge about themselves was a springboard for situating their newfound knowledge about the Underground Railroad. The instructors allowed students to select topics (e.g., religion) that interested them and provided them maximum degrees of freedom in designing their pages (while simultaneously providing support and structure). The instructors placed learning in a context that was familiar and appealing to students.

Situating learning in students’ experiences necessitated that faculty connect to students’ ways of making meaning. For example, as the semester unfolded, the instructors modified the rhythm of each class session to more closely resemble an MTV video. Students engaged in multi-tasking, shifting back and forth from one kind of activity (e.g., listening to a lecture) to another (individualized computer work).

Baxter Magolda’s (2001) third principle, mutually constructing meaning, makes both teacher and student active players in learning. It requires educators to connect their knowledge to that of the participants’ knowledge to arrive at more complex understandings of the Underground Railroad and the
city of Cincinnati’s role in it. This welcomed students as equal participants in knowledge construction, helped them clarify their own perspectives, and helped them learn how to negotiate with others. The small class size also helped achieve this aim. In fact, throughout the semester, teacher and students merged their understanding to coconstruct knowledge. Simply stated, a cornerstone of this pedagogy is human relations.

Faculty recognized that pedagogy requires flexibility, adaptability, the capacity to negotiate between one’s own and others’ needs, and the ability to cope with rapid change, ambiguity, diversity and complexity. Implementing Baxter Magolda’s principles and assumptions challenged CFI organizers. The process, not surprisingly, was turbulent at times, often leading to student resistance. Students’ attention spans were much shorter than faculty expected. Students’ lack of patience with lectures necessitated that the instructors adapt a multi-tasking format that allowed for the seamless shifting back and forth between lectures and individualized computer tasks. This strategy satisfied students. Candid conversations with students about the importance of lectures coupled with a commitment to minimizing them were prudent courses of action. Students wanted more time on the computers and more personalized instruction. They were learning, but wanted the teaching format varied and the pace accelerated. The instructors, in conjunction with the granting agency, systematically responded to the feedback, gradually employing principles advanced by Baxter Magolda (2001). The instructors listened carefully to students’ feedback and modified the curriculum to address these needs; faculty and students codesigned a revised plan. Through this retooling process, instructors got to know the students better and vice versa. The rapport between students and teachers dramatically improved. Students viewed instructors as friendly and approachable. The instructors grasped the learning needs of students and developed ways to structure the class to meet these needs.

A major shortcoming of the pedagogy was that the CFI was not linked to the students’ high school curriculum. Student outcomes would likely be enhanced if the CFI expectations and assignments dovetailed students’ day-to-day school responsibilities. This would blur the boundaries between the two valuable educational opportunities. Integrating the Critical Fusion curriculum with the high school’s curriculum would enhance student outcomes in all educational domains, not just technology.

Encouraging analysis, active learning over lectures, stating clear learning
expectations, sequencing assignments, focusing on enduring and emerging issues relevant to students, encouraging students to take responsibility for their own and others’ learning, treating students as learners, writers, thinkers, and providing regular and individualized feedback and assessment are a brief summary of the theoretically grounded teaching practices that worked.

**Student Outcomes**

This section focuses on student learning. Specifically, the analysis answers the questions—“What did the 16 students (4 men and 12 women / 12 African-American students and 2 Caucasian students) learn as a result of participation in the CFI?” Three learning outcomes are discussed. They include: enhanced literacy (e.g., the cultural heritage of the Underground Railroad and the city of Cincinnati) in general and computer literacy in particular; improved life-skills (e.g., reading, writing, working as a member of a team); enhanced understanding of and interest in postsecondary education.

**Enhanced literacy.** Gates (2000) wrote: “Today, however, blacks are facing a new form of denial to the tools of literacy, this time the guise of access to the digital-knowledge economy” (p. 71). One obvious outcome of the CFI was students’ enhanced literacy gains. Maddy’s presentation during the website premier exemplifies students’ literacy gains.

When you hear about the Underground Railroad, you hear about the South and you hear about the North, but you don’t hear about Cincinnati being a major stop…. Now I look up Colerain Avenue and think, “Slaves passed through here trying to reach freedom.” Without having done the research for this site, I wouldn’t have known that at all.

CFI students’ gains included computer and cultural heritage literacy. Prior to the CFI initiative, three students spent no time computing; six students spent 1-5 hours per week computing; four students spent 6-10 hours per week computing; and two students spent over 10 hours per week computing. At the conclusion of the CFI, all students reported spending at least 6 hours per week at a computer (even though their access to computers remained unchanged). Fourteen of the 15 students reported making daily use of the Internet.
Participation in the CFI improved students’ word processing and Internet skills. The weekly sessions, coupled with students’ out-of-class research assignments, enhanced their computer skills. The year-long seminar provided students a sound conceptual understanding of the Internet (e.g., networking, search engines, servers, URLs), and some technical skills in rudimentary web design (formatting text, scanning photographs, and linking web pages). The initiative instilled confidence in students that they could act as participants, not spectators in the information age. A representative from the grant-funding agency conveyed this sentiment during a radio interview: “These students at 17 years old are 150 times more knowledgeable of the Internet and of the building of a website than I will ever be.”

Enhanced cultural literacy was also evident. Students moved beyond mere name recognition of Underground Railroad icons like Harriet Beecher Stowe to studying her life history, as well as equally important but lesser known champions of the Underground Railroad, and professing it to others. The initiative educated students about their hometown’s involvement with the Underground Railroad. Students, in turn, transmitted their new found knowledge and activist passions to others through the Internet.

**Improved life-skills.** In addition to computer and cultural heritage literacy skills, students enhanced other life skills such as research, writing, teamwork, and oral presentations. Prior to participation in the CFI, students’ formal research skills were virtually nonexistent. Students did not know how, for example, to access traditional or electronic library resources. At the conclusion of the program, students had improved their old-fashioned research skills (e.g., searching library stacks) and high-tech search talents (e.g., conducting complex Internet searches). Students quickly realized the existence of volumes of information about the Underground Railroad, learned to access this information efficiently, and recognized the amount of time it takes to conduct high-quality research. Students learned to evaluate the quality of the scholarly work they reviewed. Students also improved their writing (greatly aided by their many written assignments such as their online biography and resumes). CFI participants also sharpened their teamwork and public speaking skills in addition to learning to negotiate, compromise, collaborate, and resolve conflicts.

**Enhanced understanding of and interest in postsecondary education.** All CFI students were enrolled in their high school’s Communication Arts program, which was a noncollege-bound curriculum. Yet, 15 of the 16
students applied to attend college. Although many factors beyond the scope of this initiative contributed to this unusually high interest in postsecondary education the CFI systematically introduced high school students to college (e.g., the course was taught by two college professors, the three day-long sessions were held on a college campus, and the University library staff assisted students with their research). The two college professors, who cotaught the seminar, modeled it after their college seminars. An indirect by-product of the multiple visits to the University was that students were able to gather generic information about collegiate admissions, financial aid, and campus life. Strolls across campus allowed students to “size up” their potential peers and dispelled some negative stereotypes about college life.

Students gained a better understanding of themselves, which is invaluable as students prepare for postsecondary education opportunities. Keela’s comment, “We made it… It is so exciting. I never thought I would be doing this,” and Marcia’s musings, “This website project is excellent. Four years from now when I am applying for a job, I can casually mention that I had a hand in building a historic website. I will make a very good impression,” reflect peers’ sentiment. Marcus, during a radio interview, noted, “It was fun and educational and it gave us a chance to evaluate ourselves as people and also to elaborate upon our lives and see what we can look forward to in the future. Knowing yourself is what everyone is striving to do, but your history affects who you are trying to become.” CFI students not only learned the history of the Underground Railroad, they learned their own history and realized their role in influencing history. They know who they are, where they came from, and what needs to be done. Most importantly they have the confidence in themselves to contribute and make a difference—all of which are very desirable student outcomes.

CONCLUSION

The CFI had great utility in this local context and can serve as model for those interested in addressing issues of equity by fusing technology and education. The program valued diversity, social justice, and democracy and fostered competent, creative, and sensitive students who are better prepared for the future.

Numerous important questions are embedded in the CFI case study that warrant the consideration of scholar-practitioners interested in this topic:
What is the role of education in this technology age? What is the role of technology in education? What role should technology play in school curricula? How can education level the “technology playing field”? What resources are needed to provide quality education that fuses education and technology? How can education and the private sector collaborate to support education?

The CFI provided not only hope but also necessary skills to assist students so they, too, can alter existing inequities. The experience greatly benefited students, all agencies involved, and worldwide website viewers. It is too early to tell how this will benefit students in the long run, but students are more technologically proficient and excited about continuing to merge technology with conventional learning. Sponsors are more confident that collaboration can be beneficial for all. All stakeholders, including myself, have learned many lessons from conceptualizing, doing, and reflecting on the project. These lessons learned will no doubt be applied to the ongoing challenge of fusing technology and equity in secondary education.

References


**Notes**

1. All the names of participants in this project have been changed to protect their identities.
2. At the time of this project, computer facilities in the students’ high school were inadequate. As a result, students were bussed two miles to an Urban Center to make use of their computer lab.