Evaluating Engagement: Computing in a Digital Arts Workshop

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ABSTRACT
Through participation in the MC$^2$ Digital Arts Workshop, students make connections to computing concepts and higher education by creating and exhibiting digital artwork. The National Science Foundation grant Mentoring for Connections to Computing (MC$^2$) introduces at-risk urban youth to computing topics as they are engaged in a university environment in an interesting and creative way. This paper discusses the evaluation of student engagement in the Digital Arts Workshop (DAW) in the summer of 2008 and includes an analysis and evaluation of 2007 DAW survey data. The 2008 evaluation of the DAW was conducted through surveys, observations and interviews. We learned that participants were interested in art and computing disciplines as possible fields of study as well as being engaged with computing while creating digital art. Recommendations are provided to enhance future outreach to introduce computing concepts to underrepresented populations through digital arts.

Keywords: K-12 computing outreach, digital arts, program evaluation

1. INTRODUCTION
Digital natives, those individuals born after computers became ubiquitous, frequently experience technology as producers of media and are comfortable creating digital art as a means of expressing their identity. They often remix existing elements to form new electronic art works representing themselves and their experiences in digital forms [1]. Teens are commonly creating digital collages through the appropriation of found images combined with new elements that reflect their identity and understanding of the world around them.

Mentoring for Connections to Computing (MC$^2$) is an educational outreach program that introduces computing concepts to underrepresented populations. As a National Science Foundation Broadening Participation in Computing demonstration project, MC$^2$ consists of three components: 1) a mentoring/teaching educational program that connects undergraduate engineering students from the University of Cincinnati with students from some of Cincinnati’s most socio-economically challenged public high schools; 2) an on-line digital repository for capturing and sharing mentors’ lesson plans, and 3) the week-long summer digital arts workshop where at-risk high school students engage in professional-style technical and aesthetic training to create and exhibit original art.

The curriculum of the MC$^2$ Digital Arts Workshop (DAW) teaches the aesthetics and techniques of collage based on the styles and traditions of the Harlem Renaissance [2]. The program provides intensive instruction that introduces the teens to new ways of expression through digital media while also providing them with positive experiences that associate with higher education and campus life.

This paper presents the evaluation of one element of the MC$^2$ grant focusing on the Digital Arts Workshop. We look at the instruments and outcomes from the 2008 DAW as well as looking back on 2007 survey data. A brief overview of the format of the workshop is provided. The evaluation plan is described with discussion of the instruments and summaries of findings from 2007 and 2008 along with student images. The paper concludes with recommendations for future workshops, data analysis and evaluation implementations.

2. DIGITAL ARTS WORKSHOP
The DAW is the result of a partnership between the University of Cincinnati and The Cincinnati Arts and Technology Center (CATC), a non-profit educational organization associated with the Cincinnati Public School district. During the school year, students from 14 high schools take fine arts or elective credits in studio-based creative courses in ceramics, sculpture, and painting as well as digital arts and computer technology. Of the approximately 400 at-risk students taking courses at CATC in 2008, 96% went on to graduate high school [2].

The Digital Arts Workshop component of MC$^2$ is designed to create an experience where at-risk urban high school students gain computing experiences in a summer art workshop. In addition to studio work, students take part in sessions on the UC campus and present their work in a public art exhibition at the UC student union. Throughout the workshop the students associate with mentoring adults engaged in computing-related professions.

The course combines Photoshop software training; aesthetic and technical instruction in collage; cultural history about the Harlem Renaissance; digital studio experiences; architectural identification, along with university cultural experiences and information about college access. All of the program elements

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are designed to broaden the students’ participation in computing activities, enhance their knowledge of university culture, and teach application of artistic traditions.

The 2008 DAW consisted of students taking part in two sessions (Groups A and B) during the weeklong workshop, each taking place for three days. Group A met Monday and Tuesday; Group B met Wednesday and Thursday. On Friday, both groups combined for an art exhibition.

On the first day at the University of Cincinnati’s College of Engineering, participants learned, through a media presentation and classroom instruction, about artists of the Harlem Renaissance and specifically about the work of African-American collage artist Romare Bearden, who created images of everyday life in both the rural south and northern cities. The students were asked to think about their future goals as inspiration for their own collages. The instructors took the students on an architectural walking tour of the UC campus to capture digital images to use in their collages.

On the second day, the students attended CATC in downtown Cincinnati where they spent the first half of the day learning the basics of the Photoshop digital photo editing software and the second half of the day creating artwork independently in a media studio.

The third day was an art exhibition and reception at the student union back on the University of Cincinnati campus where the

### Table 1. Evaluation Plan for the Digital Arts Workshop

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Project Activity</th>
<th>Measures</th>
<th>Impact</th>
<th>Evaluation Activity</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce underrepresented group to computing topics, activities and profession</td>
<td>DAW workshop (during summer)</td>
<td>Number of students (target is 20)</td>
<td>Potential impact in terms of students reached</td>
<td>Summarize registration activity</td>
<td>Beginning of workshop</td>
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<td>Pre- and post-survey; interviews with one third of participants</td>
<td>End of workshop</td>
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<td></td>
<td>Same as above; Pre- and post-survey; interviews with one third of participants</td>
<td>End of workshop</td>
</tr>
</tbody>
</table>

### 3. EVALUATION PLAN

As a National Science Foundation grant requirement, formal program evaluations are conducted on a periodic basis. The University of Cincinnati Evaluation Services Center (ESC) conducts the MC² evaluation. The MC² Evaluation Plan [3] calls for the comprehensive assessment and evaluation of all of the MC² grant activities including the mentoring program, the online digital repository, and the DAW. The plan calls for a mixed methods approach including pre- and post- surveys, interviews and observations.

Drawn directly from the MC² grant evaluation plan as related to the project activity of the DAW (Table 1), the specific objectives evaluated in this paper are the introduction of underrepresented populations to computing topics, activities, and introduction to the profession. The measures used to determine a direct impact on broadening participation in computing are: 1) a change in knowledge and interest in computing as a field of study, and 2) a change in knowledge and interest in computing as a profession.

### 4. INSTRUMENTS AND RESULTS

The instruments used in the 2007 evaluation were pre- and post- surveys. Based on analysis of the 2007 evaluation process and survey results, the MC² Evaluation Plan was modified for the 2008 DAW evaluation to include interviews with participants and studio observations. Some pre- and post-survey questions were modified to improve capture of desired data. Now the summary survey results from 2007 are given, followed by discussion of the modifications, and summary results from the 2008 evaluation. The section concludes with a discussion of the 2008 observation and interview findings.

#### Summary of Results of 2007 DAW

Pre- and post- workshop surveys were distributed to eighteen participants in the 2007 workshop: ten females and eight males. In the pre-survey, all respondents indicated “definitely yes” when asked about their intentions to attend college. Participants indicated intended fields of study that included a range of non-computer or art-related fields including medical, psychology, and legal. All respondents reported that they had access to computers at home. In describing their frequency of use, 73.7% indicated nearly daily use, 10.5% indicated use once or twice a day and 15.8% indicated use of the computer at home a few times a month.

When respondents described their frequency of computer use at school, 66.7% indicated frequent computer use, 5.6% used computers at school one to two times a week, 16.7% used the computer a few times a month, and 11.1% seldom or never used the computer at school.
In the pre-survey, all students reported some confidence in working with computers. One was somewhat unconfident, seven were moderately confident and 10 were very confident. In the post survey responses, one was still somewhat unconfident, five were still moderately confident and 12 were very confident, with two students experiencing an increase in their confidence level.

In the pre-workshops survey open-ended responses, respondents expressed their interest in participating in the digital arts workshop. They indicated they would like to have fun and have new experiences, learn more about the computer and how to use it to create digital art, and specifically to learn to use the Photoshop software.

Post-survey requests for assistance were provided in a multiple response format with respondents indicating a wide range of times staff or UC students provided support. This prompted the evaluation team to modify the question on the 2008 post-survey and to implement the studio observations as a new element in the evaluation protocol.

In the open-ended responses on the post-workshop survey, students stated moderate to very satisfied levels of satisfaction about the creation of their artwork. They liked working with Photoshop to create images and to make artwork. Most students said there was not any one thing they liked least, although many suggested that additional time to work on the projects was desired.

**Modifications**

In the 2007 survey, a question was asked about respondents’ intentions of attending college. There was a 100% indication of “definitely yes.” For the 2008 survey, to gain a more in-depth response, the question was reworded to indicate the participants’ view of how they perceived themselves in relation to degree attainment rather than asking specifically about their intended post-secondary plan. Analysis of the 2007 survey also prompted revision of the question that asked about the number of requests by participants for assistance from the instructors during the studio work time. Observations in 2008 were conducted as a means to determine if the self-reported number of interactions was consistent with observed behaviors. In 2008, interviews were conducted as defined in the evaluation plan.

**Summary of Results 2008 DAW**

For the evaluation of the 2008 workshop, two surveys (pre- and post-surveys) were distributed to participants. Observations during the studio work sessions and interviews were conducted with nine participants during the art exhibition. Fourteen participants in the program completed the pre-survey on the first day and did the post-survey when they completed the project, with some students working independently during additional lab time.

Ten of the fourteen respondents had been on a college campus prior to the workshop, with four of those having been on the University of Cincinnati’s campus.

One student indicated that he or she foresaw obtaining a high school diploma while thirteen indicated that they anticipated attending college. Anticipated areas of academic study included arts-related, computer/engineering-related, medicine, business, psychology, daycare and some indicating they were undecided.

All respondents indicated that they had access to a computer outside of school with 85.7% having unlimited access. Of the respondents, 57.1% indicated use of the computer daily, 35.7% used it once or twice a week and one person used it only a few times a month. When asked how often they use computers at school, 64.9% use it daily, 28.6% used it once or twice a week and one using it only a few times a month.

The pre-workshop survey indicated that five respondents (35.7%) were very confident in their use of computers and 9 students or 64.3% indicated they were confident. The level of confidence remained unchanged in the post-workshop survey.

Prior to the workshop, nine respondents (64.3%) indicated strong agreement and five indicated (35.7%) agreement when asked if they enjoy using the computer. Eight respondents (57.1%) strongly agreed when asked if they want to use the computer as often as possible and six (42.9%) indicated agreement. When asked about learning more about computers, thirteen (92.9%) strongly agreed and one (7.1%) agreed.

In the pre-workshop survey, respondents expressed that they were interested in learning about using the computer to make artwork and to use the computers for creativity. Respondents also expressed a desire to have new experiences and to learn digital arts specifically as a means of building computer experience. Asked what they hoped to learn, they indicated a desire to learn about computers, digital arts, specifically Photoshop software with one student indicating a desire to learn more about the University of Cincinnati.

In the post survey, participants gave a wide range of responses (2 hours to 8 hours) when asked to estimate the number of hours they worked on a computer during the workshop. The diverse responses were to be expected as the delivery of the workshop for Group A allowed for additional independent computer work time on the day following the instructional session. Group B did not have additional time.

In the post-survey, nine respondents indicated that they sought help during the workshop; four indicated they did not seek help and one did not respond. This finding contradicts the classroom observations of all students in both groups seeking assistance. Post-workshop responses indicated that 11 (78.6%) individuals were very satisfied and 3 (21.4%) were satisfied with the help they received, this is contradicting the responses of the four respondents who indicated they did not seek help. Nine participants (64.3%) indicated they were very satisfied with their artwork and five (35.7%) indicated that they were satisfied with their artwork.
In open-ended questions, respondents indicated that they liked creating work for the public exhibition, learning about the computer, learning to manipulate photos in Photoshop and being creative on the computer. They indicated that they least liked how it was difficult at first until they learned it. They did not like all the talking. Most respondents indicated they liked everything about the workshop. Suggestions included more time to work on projects and opening the opportunity up to additional participants.

**Observations**

Observations were conducted of student and instructor interactions in the classroom during individual computer work sessions lasting approximately three hours for each group. The observations of the two work sessions revealed that some participants possessed prior knowledge of the software and some were novices and becoming acquainted with the software for the first time. All respondents requested assistance from the instructors, even if the self-reported survey responses contradict this finding. Instructors assisted students with technical as well as aesthetic queries. Staff and instructors moved between the tables and made a point of addressing all the students to determine if assistance was needed. Some students demonstrated previous knowledge with the software and were able to work more productively than novices. Some students asked aesthetic questions about composition and looked for feedback on content. Others were specifically requesting technical assistance. Instructors demonstrated how to solve the technical problems by taking the mouse and doing the maneuver. Some students became disengaged when waiting for assistance. Students assisted each other technically and conversed about the aesthetic content of the work.

**Interviews**

Interviews were conducted with respondents attending the public art exhibition at the Tangeman University Center, the student union on the University of Cincinnati campus [See attached].

Overall, interviewees participating in the workshop indicated that they found the experience very enjoyable and were motivated to learn more about digital arts and about the University of Cincinnati. Some also indicated an interest in computer engineering and expressed their interest to continue studies at the post-secondary level in the areas of computers, engineering and the arts.

In the interviews, students were asked to describe the images in their work. One student described a storyline where he was ‘flying over the campus and looking down on all the people’ [Figure 1]. When asked to talk about her work, a young woman described the symbolism that represented UC and how she wanted to use that same symbolism in her piece [Figure 2].

**5. Discussion**

Overall the 2007 survey data indicated the respondents were successfully introduced to the field of computing and introduced to the profession. Eighteen students from underrepresented populations experienced the University of Cincinnati campus as students in an engineering-sponsored digital arts workshop. They documented their visit in photos and learned software to create original artwork that was shared in public exhibition. They interacted with engineering faculty and students along with receiving professional-level technical training in Photoshop software in a career development digital arts studio.

Interviews and classroom observations were not conducted in 2007. In the 2007 survey, the question was asked about respondents’ intentions of attending college. There was 100% indication of “definitely yes.” For the 2008 survey, the question was reworded to indicate the respondents’ view of how they perceived themselves in relation to degree attainment. Rewording produced more differentiated
responses as to the self-perception of the participants' future degree attainment.

In the 2007 survey, the question was asked regarding the number of requests for assistance by each respondent; in the 2008 evaluation, the question was reworded to determine if the respondent did or did not request assistance. Observations were conducted as a means to determine if the self-reported number of interactions was consistent with observed behaviors. The observations in 2008 indicated that 100% of students requested assistance, yet only 71.4% indicated on the survey that they requested assistance.

In 2008, the findings indicate that fourteen underrepresented youth were successfully introduced the field and the profession of computing. Participants learned about collage artists of the Harlem Renaissance in the UC Engineering computer lab. They toured the campus with the instructors photographing aesthetic elements to use in their compositions. They learned Photoshop and created artwork in an immersive professionally motivated workshop. Students and their families interacted with engineering faculty and the workshop instructors at the public art exhibition engaging in discussions with mentoring adults in computing and digital arts professions. In open-ended survey responses and interview narratives, respondents indicated that they were expressly interested in art and computing as possible fields of study.

The recommendations based on our experience and analysis to increase the impact of digital arts in computing outreach are to: recruit from a population of students who are not already familiar with digital arts; inquire specifically about existing knowledge of computing studies and professions to determine acquisition of new knowledge in this domain; provide explicit presentation of computer-related/digital arts related fields of study and professions; and, have students create work specifically related to their perceptions about computing/technology concepts.

In order to gain additional insight into student perceptions, conduct analysis of the digital artwork alongside participant narrative reflections regarding aesthetic and content decisions to determine how the student might be incorporating the themes related to computing and higher educational/professional pursuits into the works [4]. This content analysis of the artwork may indicate the additional attainment of new knowledge during the workshop experience.

The evaluation of the MC² Mentoring for Connections to Computing Digital Arts Workshop determined the program successfully met its objectives of introducing underrepresented populations to computing-related fields of study and professions as well as providing a positive experience for at-risk youth in a higher education environment.

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REFERENCES


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