

Holding a “Girl-Friendly” Computer Aided Design Camp

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Abstract

In the summer of 2002 high school aged campers attended weeklong Computer Aided Design (CAD) camps at the University of Maine. The camps combined computer instruction with challenging recreation activities requiring teamwork and interpersonal skills. One goal was to attract both girls and boys to this technically oriented camp. The camp was successful at attracting twenty-five percent girls. Other goals included supporting campers’ feelings of competence and being part of the group. Camper feedback from girls and boys clearly indicated that these two goals were met through the program.

Introduction

The University of Maine hosted two weeklong CAD Camp sessions during July and August 2002. The unique camps provided high school students with half-day instruction modeling objects in three dimensions using the engineering design software MicroStation. For example, campers created a still life of a table with a transparent bottle with liquid in it, a glass or glasses, and other items of their choice. They applied materials and colors creatively. Later campers manipulated each other’s images on globes to create swirled faces, faces with pointed heads, or faces with abstract textures or colors. During the second half of the day campers developed relationship and teamwork skills through the University’s Maine Bound “Challenge by Choice” Recreation Program. The recreation activities included low and high ropes courses, a climbing wall, and canoeing. At the end of each week campers and their parents were excited by the challenging technical, physical, and social experiences the camp had offered.

A goal of the camp was to reach out to girls who might not otherwise consider technical training opportunities, so the camp was planned to appeal equally to girls and boys. Prior to the camps the directors reached out to prospective campers through schools and clubs, obtained funds to provide camp scholarships, developed CAD projects of equal interest to girls and boys, and developed appropriate classroom techniques to support girls’ and boys’ learning. Of the thirty-six campers attending, nine were girls. Several of the girls planned to enter technical fields but others had no prior interest in technical careers. The directors were particularly pleased that all the girls were enthusiastic about the camp and wanted to recruit other girls to the planned 2003 CAD Camps.

This camp can be replicated on other campuses that have staff with a desire to promote gender equity in technical training to teach the CAD modeling, available room and board on campus, a suitable computer laboratory, an established summer recreation program, and an organization to handle administrative tasks.

CAD Camp

The CAD Camp was available to campers entering grades nine through twelve, and the span of the age group was represented at each camp. The first group of campers arrived on the afternoon of Sunday, July 22, 2002 and left on the afternoon of Friday, July 26. The second camp was held the following week, from July 28 to August 2. Upon arrival, resident campers met the staff and their counselors, were issued meal cards with daily spending limits to purchase food at the food court at the student union, and checked into double rooms in a campus dormitory. Day campers met the staff and visited the computer classroom.

Eighteen campers attended each session, with four and six commuting campers per session respectively. Five girls attended the first session and four girls attended the second session, with one girl commuting per session. The remainder of the campers resided on campus. Campers from twenty-five different domiciles from all areas of the state attended.

Each morning campers received CAD instruction and practice. The CAD instruction was held in a computer laboratory with 24 student workstations and a teacher station. A Versatech system allowed the instructor to display techniques on the student screens and via an LCD projector to a screen.

After lunch campers participated in Maine Bound Program activities. “The University of Maine's Recreation Program, Maine Bound Program is an outdoor adventure education program that takes learning out of the classroom and into the natural, elemental setting of rivers, mountains, and forests.”¹ The Maine Bound activities took place on the low and high elements courses in the University Forest adjacent to campus, at the Maine Bound Adventure Center Climbing Gym, in canoes on the Stillwater River adjacent to campus, on sports fields, and in open areas adjacent to the Stillwater River.

After dinner campers had a choice of returning to the computer laboratory for supervised open computer time, or participating in activities such as swimming, academic departmental programs, or informal sports. Counselors guided informal late evening activities.

Claude Junkins, the Campus Estimator who also serves as a Cooperating Lecturer in Mechanical Engineering Technology, originated the CAD Camp idea and served as Director. He is certified as a MicroStation Trainer. He dedicated vacation time to working with the camp.

Karen J. Horton, Assistant Professor, Mechanical Engineering Technology served as the Assistant Director. Assisting in the classroom were a female Lecturer from Spatial Information

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Engineering, and a male Assistant Professor from Mechanical Engineering Technology. Having both women and men to serve as instructors was viewed as important both to mentor girl campers and to “normalize” their participation in this technical camp. The Maine Bound Program supervised a male and a female counselor who directed the recreation activities and provided dorm supervision. The Women’s Resource Center supervised graduate assistants who provided gender equity activities for the girls and interviewed the girls about their camp experiences.

The Conference Services Division provided the administrative support for the camp including all correspondence with campers prior to camp, receipt of payments, and disbursement of funds after the camp.

Funding the CAD Camp

The actual cost to provide the camp was \$660 per resident camper and \$470 per day camper. These costs were subsidized by two large grants and several smaller grants. Resident campers paid \$450 for a one-week session. Day campers paid \$250 per session. A number of full scholarships were made available with scholarship campers paying a \$25 registration fee.

The University of Maine Women in the Curriculum (WIC) program provided \$2000 of direct summer salary support for the outreach to girls, the development of girl-friendly classroom techniques, and an evaluation of the success of the camp in appealing to girls.

The Maine Department of Transportation Office of Small Business Programs developed an Agreement for State/University Cooperative Project received through the Office of Research and Sponsored Programs. The program grant was \$10,000 and allowed a total of seventeen scholarships to be offered, designated for girls, minorities, or disadvantaged campers. Eight scholarships supported girls; the remainder supported economically disadvantaged boys.

Two companies related to Bentley’s MicroStation contributed \$450. Bentley gave the camp permission to give students one-year copies of academic versions of the program. The College of Engineering provided mailings, advertisement, and supplies in excess of \$500, as well as assistance such as the administrative support in the computer laboratory.

While the camp “broke even” financially it did not adequately fund staff time. Because of the high satisfaction campers expressed, in 2003 we are preparing for a larger group of campers. The additional expected revenues are planned to better support staff. Per camper expenses are expected to be about the same but campers will be charged about ten percent more than last year.

Camp Outreach

Letters, flyers, phone contact, e-mail announcements, posters, press releases, and personal visits were used to reach out to prospective campers or to those who work with prospective campers. These contacts are summarized in Table 1.

We asked campers directly where they heard about the camp. One camper was referred through Women Unlimited. A number were referred through school guidance counselors, science teachers, computer teachers, and outreach programs for disadvantaged students. Several had family members who received a direct campus mailing. At least one read about it in the local newspaper either through an advertisement or a press release. Several attended the Engineers Week activities on campus and took home a flyer.

During the camp two local television stations visited the camp, interviewed campers and staff, and reported on the camp on the evening news. The University of Maine Public Affairs Office took extensive video and interviewed a camper; the interview was used as the basis of a University radio advertising spot.

Institution or Group	Letter or Call	Written material	Visit	Email
Mailing list of all public high schools guidance counselors, programs for disadvantaged students	x	x		
Direct campus mailing to faculty and staff		x		
List-serves of math teachers, science teachers				x
Engineers Week outreach activities		x		
Girl Scouts of Abnaki and Cumberland Councils	x	x	x	x
Maine Centers for Women, Work and Community, and Women Unlimited	x	x		
Society of Women Engineers	x			x
Local public and private high schools and middle schools			x	
Advertisement and press releases in local newspaper		x		
University web sites		x		

Table 1. Summary of CAD Camp outreach activities.

A “Girl-Friendly” Computing Environment

One of the camp goals was and is to attract girls as fifty percent of the campers. The listed reference “Unlocking the Clubhouse”² offers many suggestions for a “girl-friendly” computing environment. One is to reach directly out to girls and state that the program will meet their preferences. Another is to select computing projects of interest to the audience, including girls. In short career exploration seminars for girls Marie Planchard introduces three-dimensional jewelry design.³ A third is to assure the environment doesn’t cater to the exclusive interests or social structures preferred by some boys. For example, some boys in the second camp session engaged in a “hunt and destroy” type video-game network during evening open computing time. The girls and some other boys found this inappropriate in the context of the camp, because of the exclusivity of participation and the violent content. It was seen as building a “sub-group” within

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the team of campers. We now know to explicitly state that no networked games, particularly of a violent nature, will be allowed either in the CAD classroom or the open computing period.

Claude developed modeling projects to engage all campers. We developed completion strategies and teaching methods suitable for the age group. Campers started the first morning by modeling a simple house, including windows, doors, a roof, and internal lighting. They selected colors, materials, textures, and lighting. The next morning campers began modeling a table with a transparent bottle with liquid in it, a glass or glasses, and other items of the students' choice. The third morning each camper projected a digital image of another camper's face onto a globe then manipulated the image to create swirled faces, to apply creative "washes" to make the images look like watercolors, and so on. Proficient campers in the first camp session went on to model a guitar. Campers not ready for this level of challenge chose to refine and develop their earlier projects. In the second camp session the final project was a nature scene including cattail reeds. Some campers developed their own final projects depending on interest such as skateboards and snowboards or ideas using previously developed shapes such as candles. At the end of the week each camper selected two projects to print, mount on foam board, shrink-wrap, display at the closing barbeque for their families, and take home with them. Campers found shrink-wrapping their projects (and other objects) particularly entertaining. Figure 1 displays two camper projects.

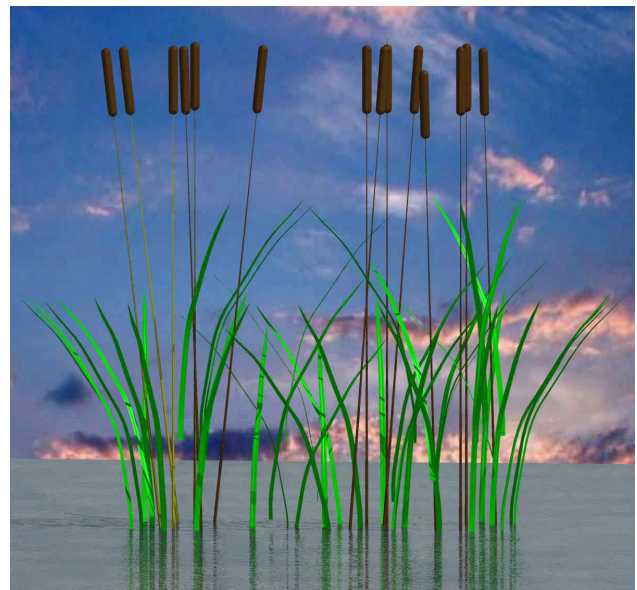
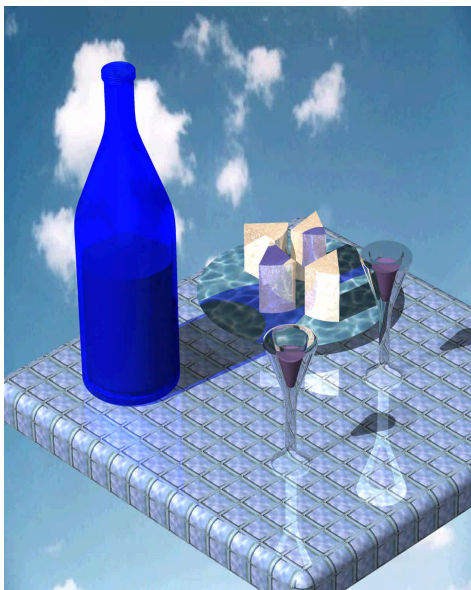


Figure 1. Campers completed gender-neutral projects.

In the CAD classroom campers were given opportunities both to watch demonstrated techniques and repeat them, and to obtain personal assistance. The typical procedure was for Claude to introduce a drawing project or a portion of the project with an overview including a quick step-by-step lesson. I then repeated the lesson slowly on the projector while Claude and available assistants helped campers. We all worked with campers until they had completed that step.

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More proficient campers had time to work on the project independently before Claude and I repeated the cycle. Boys and the girls viewed this combination of techniques positively. Some would have liked “faster” individual attention since they had to wait for assistance, but often campers with more advanced skills helped those having problems.

Under the WIC grant staff of the Women’s Resource Center interviewed girls about their camp experiences. At the first camp one girl was planning on studying architecture and another was planning on studying naval engineering. Both needed CAD training but didn’t have a CAD course at their schools. During the second camp three girls visited the New Media program at their request. Girls who had little previous experience with the computer reported developing a sense of competence beyond what they expected to achieve. Research has shown that self-efficacy is a key component in girls selecting technical careers.

Recreation Activities

The goal of the recreation program was to offer opportunities for campers to develop self-confidence through team activities. This strategy offset the individualism and lack of camper-to-camper interaction that characterizes computer modeling. Diminishing self-confidence in technical courses is regularly reported among young women in engineering programs. It is hoped that an overall sense of self-confidence will extend from the recreation program into the CAD instruction for all campers. We hope the recreation program encourages campers to tackle the new challenges on the computers as they tackle the recreation challenges.

The Maine Bound Adventure Center recreation program is called “Challenge by Choice” and campers could choose their own levels of involvement. Several girls accepted challenges beyond what they had previously experienced and most participated in the climbing wall and the high elements course. Boys and girls developed fun and friendly relationships with one another through the recreation program. Campers expressed enthusiasm about this combination of computer training and recreation activities.

Camper responses

Campers wrote very brief notes thanking the sponsors. Several excerpts follow.

“The camp was a lot of fun, I learned a lot about CAD and was able to create such things as a juice bottle, a picture of my head on a 3D ball, and a guitar. The afternoon activities were great too. We used the campus ropes course, something many of us have not ever done, and we learned to work together in challenging activities. Also the food here was really good, the counselors were a lot of fun and easy to get a long with.” (girl)

“I thought the camp was extremely fun. I’ve been to a lot of sports camps before but none as fun as this one. I really enjoyed the different things we created using the CAD program but also the recreation activities we did after class. I’d have to say the ropes course and the rock wall were my personal favorite.” (boy)

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“This week has been one of the best Camp/Learning experiences I’ve ever been able to enjoy. I’m not only walking away with much more knowledge of computers, CAD, engineering and Rec. activities I’m also leaving with new friendships, a new campus and class view of U Maine and the links to the people here who may be able to further assist me in my future.” (girl)

Conclusions

Campuses with staff and facilities similar to those used by this camp can replicate the camp locally. We plan to hold the camp again in 2003 and feel confident that with an earlier start at seeking funding and advertising we will be able to significantly increase enrollment. One goal is to attract an equal number of girls and boys to the camp. Girl and boy campers from 2002 have already asked about coming to CAD Camp again in 2003.

We are considering involving technology teachers in the upcoming camp and we are considering offering a teacher camp to introduce the classroom inclusion concepts developed in “Unlocking the Clubhouse.”² We would use the same type of format for teachers, including the half-day recreation.

While the camp was not self-supporting and required grant funding, the level of funding required was achievable from local sources. The DOT has informally stated that they would like to continue funding the camp, and will seek more funding from other units within the DOT.

A future step is to seek funding to follow our campers longitudinally to determine if the camp influenced their educational and career choices. Campers made clear in their comments that they will remember the camp fondly.

Acknowledgements

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KAREN J. HORTON, Assistant Professor of Mechanical Engineering Technology, University of Maine, participates in a wide range of K-12 outreach activities, particularly directed toward girls.