

**Center for Image
Processing in Education**

**Ocean Explorers
Focus Group Report**

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February 2005

WestEd

Introduction

This report has been prepared to support Ocean Explorers' leaders in their effort to refine and strengthen the program. In December 2004, Ocean Explorers participants responded to open-ended questions on the quality of their experience in the program to date and any additional support they might need from program staff. In January 2005, WestEd staff members led three focus groups at the Ocean Explorers Think Tank in Camarillo. These focus groups examined the quality of the Ocean Explorers experience, how to attract females and minorities to careers in information technology (IT), and teachers and IT careers.

Data from these open-ended questions and focus groups form the basis for this report. We begin by reviewing what participants had to say about the Ocean Explorers experience, including its strengths and areas for additional support. We then move to examining what teachers had to say about the status of females and minorities in IT careers, looking first at why more females and minorities do not go into IT careers and then at what teachers might do differently to attract these students to IT professions.

The Ocean Explorers Experience

This section reviews the experiences of Ocean Explorers (OE) participants in the project. Key issues include participants' experiences working in groups (i.e., advantages and challenges), being a part of a professional learning community, and how Ocean Explorers has changed teachers' practice.

Participants were positive about their OE experience. Their attitudes toward group work depended on the situation. Those who were part of a larger group at the same school were generally more positive and spoke highly of their group and group members. Some participants commented that networking and collaborating was the most valuable part of the OE experience in helping their teaching practice.

On the other hand, some participants were less positive about the group experience. One reason for this frustration was physical distance between the group members, making scheduling meetings and sharing equipment difficult. In other instances, group members did not attend scheduled meetings, while in other cases having new group members added to teams in the midst of the project led to some confusion and frustration. Some participants also mentioned difficulty working in groups when members have different levels of technical skills. One participant, who described herself as a "tinkerer", suggested sending materials to participants before the workshops so those who like to explore something before could become familiar with the workshop's topic.

Focus group participants offered suggestions for how CIPE could offer more logistical support. A concern among teachers is that they have limited time during the day to contact resource people who can help them plan their lessons. For instance, one teacher said, he has little time to play phone-tag with someone from the Department of Fish and Game to get the data his group needs for their project. He said his group is fortunate to have a member who is not a teacher, and therefore has a more flexible, accessible schedule, but cautioned that other groups probably do not have the same option.

Teachers suggested that one solution to this problem was to have OE project leaders facilitate resource sharing across projects. For instance, they said, OE leaders might know that multiple groups need similar information from the same office, and could coordinate a single effort to get that data. OE leaders might also help projects connect with one another to tap into existing contacts, as when one teacher has a key contact in an office and can facilitate contact for another OE team. The teachers noted that CTAP Online may be a good forum for sharing contacts, needs, and ideas.

As part of the focus groups, we raised the question of why survey results indicated women and minorities were less likely to feel part of a professional learning community than other OE participants. The participants, most of whom were females and minorities, reacted with surprise at this finding, indicating they felt very much a part of the community. Nonetheless, they did speculate as to why this may have been the case. One suggestion was that participants with more technology experience are more likely to feel part of a learning community built upon technology. One teacher suggested the question may be due to how participants interpreted the meaning of “professional learning community.” She noted, for instance, that the January 2005 think tank was the first time the entire OE project was together, and so, while she felt very much a part of her group, she was only beginning to feel like a part of the OE learning community. Another participant said she must master something before she feels a part of a community, and she has not yet mastered the OE experience. She suggested that if others feel the same way, perhaps they were less confident about feeling part of the learning community.

Finally, we wanted to know the impact that the Ocean Explorers experience had on teacher’s teaching practice. Teachers commented that they use more technology in the classroom and feel more comfortable using it. They find their students excited when technology (e.g., GPS unit, GIS software) is used in relation to real-world experiences. For example, one teacher showed her students before and after pictures of the recent Tsunami in Thailand using the GIS software.

Females and Minorities in Information Technology

Ocean Explorers participants offered a variety of reasons why females and minorities may elect not to enter IT careers. While some of these included the familiar reasons of teaching styles and absence of role models, the teachers also pointed to the importance of making IT appear relevant to students from these groups, the need to help these students feel comfortable taking risks, and the importance of relationships in attracting students to the field. Teachers suggested that increasing opportunities for group work, being patient and giving students time to struggle, and providing recognition and opportunities for students to see the relevance of their work are important steps in attracting females and minorities to IT careers.

Reasons for Limited Participation

Teachers offered a variety of reasons for why, they believe, females and minorities do not go into IT careers in greater numbers. One reason identified by OE participants was the perceived relevance of IT, and the subject areas that support entry into IT careers, to students. As one teacher pointed out, it is not that students see IT itself as irrelevant. Indeed, students are quick to adopt technology that is easy to use and practical for them, such as cell phones and text messaging. However, teachers agreed that girls and minorities often see school-based IT and IT-related subjects as removed from and less relevant to their lives. One teacher noted that a digital arts academy at her school has a difficult time attracting girls. She attributed this in part to the fact that the academy focuses on having students design video games – something generally less attractive to girls than to boys.

A second reason teachers gave for limited participation was that students in general, and females and minorities in particular, are hesitant to take risks and afraid to fail. On one level, the teachers said, no student wants to risk looking dumb. This is particularly true when it comes to IT and so students often elect to not take risks that, should they fail, would make them look dumb. Teachers agreed that it is common for students to look to the teacher for the answer and to fear offering a wrong answer. The OE participants said this fear is particularly prominent among girls, who are more hesitant to just “jump in.” Teachers suggested girls generally prefer to assess the situation and craft a plan for succeeding, as opposed to boys who are more likely to jump in and explore first, worrying less about a plan for success. As a result, the teachers suggested, boys get more direct exposure to IT and IT-related subjects, with girls left in the background.

A third reason given by teachers is the importance of relationships and collaboration to females and minorities, which are often not emphasized in IT in particular, and in schools in general. For example, one teacher noted, IT careers and subjects are not seen as providing much

interaction. A female teacher, linking the question to her own OE experience, said she joined the project in part because of the opportunity to work in teams. She added that part of the appeal of teams was that she felt working in a group would allow her to learn without feeling “dumb” because of her limited IT knowledge. The teacher suggested this sentiment applies to female students as well. Another teacher noted the importance of collaboration and group work is also particularly important for Hispanic students. One teacher observed that females like to feel *part* of something (alluding to the idea of relevance discussed above). He has found working through the social networks that already exist among girls at his school as important in attracting them to advanced science and mathematics courses.

In addition, OE participants offered other possible explanations for the limited participation of females and minorities in IT careers and IT-related subjects:

- **Limited Access:** Some students simply do not have reliable and regular access to IT equipment. One teacher said she has seen her students (including girls and minorities) become much more engaged with IT since they gained regular access to technology. Teachers also noted that access is often complicated by the tendency of boys to be aggressive about problem-solving and using technology, often resulting in girls watching as boys lead a group through a problem or exercise.
- **Teaching Style:** Teachers said that the traditional lecture approach to teaching, which some teachers still use, often turns off girl and minority students. In addition, one teacher noted, the lecture approach can be particularly difficult for students for whom English is their second language.
- **Role Models:** Teachers called attention to the general lack of role models for girls and minority students in science, mathematics, and IT-related subjects. One teacher said he has seen what used to be a drop-off in girls in IT-related courses between tenth and eleventh grades improve somewhat with more female role models, but it continues to be a concern. One teacher said she was shocked when, after showing her class a video that included Mexican scientists, the first question students asked was, “There are Mexican scientists?”

Strategies to Involve Females and Minorities

OE teachers offered multiple ideas for how they and their colleagues might be able to support and encourage students to enter IT careers. While the specifics of the ideas differed, one common theme across them ideas was the importance of involving students in teaching each other and recognizing their efforts and successes.

Teachers identified the opportunity for group work and collaboration as important. They noted that working in groups can help students feel more comfortable taking risks and exploring challenging subjects, but educators must still guard against the likelihood that students will look to them for answers. One teacher noted that while group work is valuable, school must be structured to support it. For instance, he said, many Hispanic students are thrust into parenting roles at a relatively young age, and are expected to work or care for younger siblings right after school. Therefore, he said, the school day must allow students to collaborate during school. His school has addressed this need by having teachers elect to stay in their rooms during a free period, giving students a place to work together informally.

OE participants also again highlighted the importance of providing students with role models who are working and successful in IT. On one level, this might mean having women and minorities who are successful IT professionals visit schools and serve as role models for students. On another level, teachers agreed, *students* can become role models for one another. For example, older public school students might teach younger students, helping the older students see the relevance of the knowledge and providing younger students with role models. In addition, schools might work with colleges to have college students visit public schools to help young students recognize what they can do in IT-related fields and subjects.

Teachers also spoke about the importance of recognizing student accomplishments as a way to nurture interest in IT subjects and careers, and they related this idea directly to the OE project. These ideas included:

- Provide opportunities for OE students to volunteer at and work with those in industry, exposing them to real work and real projects.
- Find ways to display student work at community colleges and/or universities, as a way to both recognize student accomplishments and get them to visit postsecondary educational institutions.
- Have an OE student conference, where students are able to present their projects and earn recognition for their work.
- Have groups of OE students from different schools visit one another to show their projects, earning recognition and serving as peer role models.

In addition to the above ideas, OE teachers suggested other strategies:

- Dividing classes by gender will give females the opportunity to explore and develop skills and knowledge in a safer setting.

- Teachers agreed on the need to be patient, giving females in particular the chance to understand the task and come to possible solutions on their time. They must also be patient and resist the urge to provide immediate answers. However, they agreed, having the time to let students explore has become more difficult given the emphasis on standards and testing.
- Give students early and frequent access to IT. Even today, some schools do not have current and/or sufficient IT resources to serve all students.
- Teachers wanted more knowledge about what background skills and knowledge students need to pursue IT-related majors in college. For instance, one teacher asked, what does a student graduating from high school need to know to be able to major in GIS in college?

Conclusion

Ocean Explorer participants enjoy the group work, networking, and collaboration that are part of the OE project. They are engaged in the learning process and implement what they learn in their classrooms. While they see a growing need for logistical support and resource sharing as they look toward developing their own projects, they also recognize and appreciate the support provided by OE leaders to date.

Related to the question of attracting women and minorities to information technology, teachers suggested several key steps to accomplish the goal. They noted that the content and subject must be made relevant and engaging for students (through collaboration and relationship-building, for instance), that teachers must allow students to take risks and give them the time to do so, and that student work in the field should be recognized and rewarded.