

# Young Minds at Battle

*Taiwan's senior high school students stand out in international science contests. In an attempt to enhance efforts to win more Olympiad medals for budding scientists, scholars hope to create an environment that will foster creative and original talent.*

**BY OSCAR CHUNG**

PHOTOS BY CHANG SU-CHING

Last year, Taiwan's International Science Olympiad teams again proved that they are formidable opponents. For the first time, the island hosted the 34th International Physics Olympiad (IPHO)—a global competition for science students—in Taipei. Taiwan has performed well over the years in a contest where the best young minds strive for recognition.

Taiwanese students began participating in the math and chemistry Olympiads in 1993. They later appeared in other science Olympiad competitions featuring physics, biology, and information science as well. In 1998, Taiwan hosted the math Olympiad for the first time. Students from 80 countries came to join the 39th International Math Olympiad, where Taiwan came in fifth place, its highest score to date. In the areas of chemistry and biology, Taiwan has taken the top honors.

Academics screen and train prospective candidates. In math and physics, they first select students for two regional Olympiads—the Asian Pacific Mathematics Olympiad and the Asian Physics Olympiad, which Taiwan has participated in since

1991 and 2000 respectively. Taiwan's teams often end up with the top scores in these contests, and the best contestants go on to compete in international events.

"Natural sciences generally get more attention than social sciences in Taiwan, and the parents are serious about their children's education, which helps explain these contestants' excellent performance," says Lee Jan-yao (李然堯), director of Secondary Education Department of the Ministry of Education. The students who are selected to compete for the top spots in the international Olympiads must take part in a rigorous training program.

According to Lin Ming-juey (林明瑞), organizer of the 34th IPHO and professor of physics at National Taiwan Normal University, about 300 students were chosen out of a group of 4,000 after completing a screening examination at the preliminary level last year. After that, the top 30 students went to the training camp for two weeks before taking additional tests for a third week. In the end, eight went to the regional Olympiad from which five were chosen for the international competition.

In the training camp, more than half of the trainees' time is spent doing experiments to learn how to deal with experimental problems included on the Olympiad test. "I feel uneasy about this part," Lin says. "Taiwan's senior high school students don't have much experience with actual experiments. And their teachers aren't preparing them for hands-on experience. They only have experiments on paper." However, the preparatory courses quickly bring the students up to speed. In last year's IPHO, the Taiwanese team, which had the third highest ranking of 54 teams, ranked second in the experimental problems section, even higher than its performance on the theoretical section, where the team ended up in fourth place.

The training camp for the International Mathematical Olympiad (IMO) is quite similar. Students sharpen their skills in the training camp by taking a series of mock tests modeled on the Olympiad. "The camp is very important when it



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## Education

comes to seeking high scores in the contest. Students often improve phenomenally after the training,” Fuh Cheng-der (傅承德), a research fellow at the Institute of Statistical Science of Academic Sinica, says. Fuh is also in charge of Taiwan’s efforts to compete in the IMO.

**T**he experience of participating in the international contest proves rewarding for students like Chen Tse-yu (陳則宇), a gold medalist at last year’s IPHO. “It broadened my horizons, and after preparing for the Olympiad, I learned how to arrange my time better,” he says. In 2002, the ministry surveyed 128 students who have been given awards at Olympiads between 1992 and 2001. Most respondents agreed that the best part of participating in the Olympiad is the recognition they get for their achievements. The contests are also seen as a good chance to network among other students.

A more practical reward is the ministry’s support of the students’ desire for a higher education. Students often view this as incentive enough to join the competition. In the 2002 survey, respondents said that their major worry when preparing for the contest was that they might fall behind in their studies.

Those who choose one of the tested subjects as their major in college are encouraged further. The ministry is considering making it compulsory for universities to accept such students. The ministry is also granting scholarships to Olympiad award winners who stay with the subject in which they won an award. For gold medalists, the prize money is NT\$200,000 (US\$5,880) for the first school year, but the scholarship can be canceled if a student fails to perform well. The ministry hopes these programs will draw more attention to basic sciences, such as math, chemistry, and physics, which have long been less at-





tractive to high school students than subjects such as engineering and medicine, which are more likely to lead to a lucrative career.

Taiwan has become a strong competitor at the International Science Olympiads. To what extent, however, have the performances translated into real results for Taiwan's scientific research? Lu Yi-tsung (呂易聰), last year's gold medalist in the International Chemistry Olympiad, doubts the Olympiads contribute much talent to Taiwan's science community. "The goal of the training project was to enable students to get high scores in the Olympiad," he says. "It's not so different from public school where students are trained to perform well in exams. These things don't really encourage creative thinking."

Fuh has been reflecting on the issue as well, noting that the training camps should do more than just prepare students for the contest. Since last year, math experts have

been invited to the training camp to talk about their research and give lectures. "The development is significant. Students won't get high scores by listening to these academics, but I hope they will see the benefits of independent thinking."

The Wu Chien-Shiung (吳健雄) Science Camp, the most prestigious of its kind, has been enlightening Olympiad hopefuls and cultivating would-be scientists for years. The camp, a one-week event held

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**Wu Chien-Shiung Science Camp** has been helping educate young gifted students, including those on the Olympiad teams.

annually since 1998 under the Wu Chien-Shiung Education Foundation—established in memory of the world-renowned female physicist—accepts 120 students, including participants who are on the national math, physics, chemistry, and biology Olympiad teams. Sixty openings are reserved for science teachers at senior high schools to encourage them to receive on-the-job training. Participants are expected to move beyond formal education and to learn how to think and ask questions by attending lectures and interacting with prominent academics.

**T**he mission of cultivating talent in the scientific community does not stop with educating top students. “Materials available to gifted students should be available to all of the students,” Lin says. Bearing this in mind, every year he collects test questions

used for screening students for the national IPHO team and makes them available on the market. As a joint effort by university professors, these problems are far more enlightening in comparison with the traditionally stiff ones used by cram schools. “Bad test questions will only diminish students’ creative abilities,” he says.

Lin wants to distribute teaching materials used at the camp to high-school teachers so more and more students will be prepared for similar challenges. He believes that the materials written by academics who have been involved with the Olympiads can boost the effectiveness of public school teachers, who he says lack the proper training.

At the same time, the math Olympiad training camp, which normally recruits 50 students, is hoping to recruit 20 more. Most trainees come from several top high schools, but Fuh hopes to establish a quota



system for the additional 20 students by guaranteeing at least one opening for each of the schools that have classes for students who are good at science but are less competitive than the more prestigious schools in Taiwan. "Students from these high schools pay little attention to the Olympiad because it looks remote to them. But if you offer them a chance, they will be more interested in participating," he says. "Those students may have great potential, but their talent could remain undeveloped due to a lack of educational resources or training." Lin and Fuh are attempting to contribute to Taiwan's long-term development in addition to their work on the Olympiads. "Those on the national teams might be one-time geniuses, and the really outstanding talent might never join them," Fuh says.

Fuh concedes that both he and participating students are under great pressure to

bring back more medals from the Olympiads. He also recognizes that the teams need to improve. "I think we need to set up organizations that will be responsible for preparing students for the Olympiads." While scholars like Fuh look beyond performance in international competitions, they also recognize the excitement and motivation that Taiwan's Olympiad teams bring home with their medals. ■

**Who is the next math guru? The math training camp is recruiting more students to increase the chances of finding great minds in the field.**