



Case Study

Pakistan

Intel International Science and Engineering Fair

Intel International Science and Engineering Fair (ISEF) Helps Pakistan's Students Improve Science Literacy

While economic indicators for Pakistan position the country as a regional leader, education remains inequitably distributed among various income groups and regions in the country. The Government of Pakistan's *Poverty Reduction Strategy Paper (PRSP)* in 2000, reinforced that education is one of the most important factors in helping to promote equitable economic growth and reducing poverty. Pakistan's vision is to have education for all its citizens. A strategic outcome of the *PRSP* is the formulation of the Education Sector Reforms (ESR) Action Plan, which aims to rectify these problems by dramatically increasing education access, particularly for girls, and improving the quality of science education. The Intel International Science and Engineering Fair (ISEF) is part of the country's effort to develop private-public partnerships to improve educational quality, access and science literacy.

The Pakistan Science Foundation has recognized Intel's science fair as the leading science competition in the country.

Challenge

- Pakistan has a combined primary, secondary, and tertiary enrollment rate of 35 percent of its school-aged youth, according to the United Nations Development Program (UNDP), ranking it 165 among 173 countries.
- Literacy rates (49%) are below those in other South Asian countries with similar levels of economic development.
- Girls in Pakistan face unequal access to education.

Approach

- The Government of Pakistan established the Education Sector Reforms (ESR) in 2001 to address these education challenges. The reforms are spread across all subsectors of education, from early childhood to the tertiary level.
- A centerpiece of the ESR is to ensure girls' full and equal access to education and to achieve high quality basic education.
- The government encourages the formation of private-public partnerships, such as Intel ISEF, as a way to achieve its goals in education reform, particularly in science education.

Benefits

- Intel ISEF helps students in Pakistan build necessary science inquiry skills that helps prepare them to compete in a 21st century global economy and become future innovators.
- The program contributes to improved science education at secondary and upper secondary levels, which serves as an important gateway to professional and higher education.
- The program promotes high-quality education for girls by providing project mentors for all students, regardless of gender.



Sixteen-year-old Fatima Shami lives with her family in Islamabad and was studying for her O levels at the Islamabad Convent School when she decided to develop a project for Intel ISEF. In describing herself, Fatima said, "I really like people who want to help others and make a difference in the world. Personally I want to help special people and make their lives as normal as possible."

Fatima set out to discover through her research whether reused oil is harmful to human health. Approximately 1.5 billion people in South Asia consume fried foods that are usually cooked in reused oil. "No one had ever tested this oil for its harmful contents formed due to its reuse," said Fatima, "and I was the first to test the reused oil in which specifically samosas, pakoras, and jalabis are cooked. The shopkeepers and vendors keep using the same oil to cook these foods. I tested samples of reused oil both from home and the market, and found out there was 100 percent abuse of oil samples taken from the markets. I also found out the effects on oil caused by its reuse and about the different toxic chemicals formed and the diseases they cause. I was helped by Dr. Zaheer Ahsan from the National Agricultural Research Centre (NARC) in Islamabad, who assisted me in the analysis of samples of reused oil. I used books, research studies, the Internet, and students [for my survey]. Next I would like to do a detailed research to investigate polymerization in edible oil under local situations and try to invent a chemical additive for increasing the oil's capacity of reuse."

Fatima's project qualified her to compete as an international finalist at Intel ISEF 2005. She traveled to Phoenix, Arizona, and competed against 1,400 young scientists from more than 40 countries. In commenting on how the Intel ISEF Program influenced her life, Fatima responded, "I have started observing things more carefully and trying to understand how they actually work. Now I know how to write a proper research paper. My observation skills have definitely improved, and I try to find out about more new things around me." The program has also affected her plans for the future. "My goals in life have suddenly changed. In the future I want to find cure to common cold by developing a vaccine. I am planning to get my Ph.D. at Harvard University and want to win a Nobel Prize for my country. I am more confident and have learned never to give up."

Education in Pakistan

Pakistan's Education Sector Reforms (ESR) Action Plan, a reflection of its national education agenda acknowledges that the accumulation of human capital is just as important as the accumulation of physical capital for sustaining development. The plan states that in the absence of a healthy and literate population, it will be difficult for Pakistan to bring about a real increase in productivity. With the reform effort, the government is committed to improving access to education services that enhance the human capital of the poor and enable them to generate income through asset utilization and gainful employment.



“My observation skills have definitely improved, and I try to find out about more new things around me.”

Fatima Shami
Intel ISEF 2005 Finalist

ESR's aim is improve education in all aspects, ranging from rehabilitation of physical facilities to support of multiple delivery systems and teacher training. The plan is in accordance with Pakistan's constitutional provision, which guarantees its citizens the fundamental right to education.

The 2000–2001 primary level participation rate in Pakistan was 68 percent for males, while only 53 percent for females. Consequently, gender equality has become a major emphasis for Pakistan's ESR and Education for All action plans, in order to eliminate gender disparity in primary and secondary education and achieve gender equality in education by 2015.

The ESR Action Plan acknowledges that science education at secondary and upper secondary levels is important as the gateway to professional and higher education. Improvements in science education through the ESR include the planned construction of new science labs in approximately 3,000 schools. The plan also includes providing additional equipment to the roughly 5,000 institutions with labs lacking adequate tools.

Intel ISEF in Pakistan

In support of the goals of the ESR, the Pakistan government has undertaken policy reforms and provided incentives for public-private partnerships to flourish in the education sector. From initiating innovative programs to working in tandem with non-governmental organizations (NGOs) that manage public schools through formal adoption, the government has stepped up its efforts to include various other stakeholders in the delivery of education. While the collaboration of these different players in the education sector is not a new phenomenon in Pakistan's history, it is the first time that this interplay has been recognized, supported, and given a mandate to succeed.

Intel ISEF is part of Intel's effort to contribute to the development and science education reform in Pakistan. As the world's largest pre-college science competition, Intel ISEF awards more than USD 4

million in scholarships. The finalists are selected from more than 550 Intel ISEF-affiliated fairs held in 45 countries worldwide, reaching millions of participating students.

In Pakistan, young scientists from all over the country compete in district, provincial, and national competitions to qualify for a place at the Intel ISEF finals. Since 2004, the provincial and federal ministries of education have supported the program in spirit and through financial support. Pakistan's Ministry of Education support includes funding the travel and allowance expenses for students and teachers attending the workshops and fairs. Workshops and science fairs across the country reach out to more than 2,500 students in grades 9 through 12 and 500 science and math teachers on an annual basis. Approximately eight research workshops are held each year to educate students and teachers about research-based learning and Intel ISEF. Four district fairs and four provincial fairs feed into the National Science Olympiad, which is the only fair in Pakistan affiliated with Intel ISEF. Every year, winners of the competition secure a slot to compete at the Intel ISEF finals in the U.S.

In 2006, the Federal Ministry demonstrated its support for the National Science Olympiad by committing USD 65,000 over three years to support event. Intel ISEF will continue working with the Pakistan Science Foundation to introduce 500 science clubs in schools across the country and train facilitators in these schools on the Intel science curriculum. The program will improve the quality of projects participating in feeder and affiliated fairs by expanding the pool of mentors available to the students, through involvement of community experts, the private sector, and new universities.

The Pakistan Science Foundation has recognized Intel ISEF as the leading science program in the country. The foundation handpicked ISEF National Science Olympiad finalists for a science competition in Korea, and all four participants from Pakistan came back as winners.

Intel® Education Initiative

The Intel® Education Initiative is Intel's sustained commitment to prepare all students, anywhere, with the skills required to thrive in the knowledge economy by improving teaching and learning through the effective use of technology, and advancing math, science, and engineering education and research. Through a sustained, public-private partnership with educators and governments in more than 50 countries, Intel works with international organizations and governments at international, national, and local levels and invests approximately USD 100 million per year in education programs adapted to address the needs of each country to advocate 21st century educational excellence through policy work and awareness efforts.

- For more information, visit: www.intel.com/education

- For more information on the Intel International Science and Engineering Fair, visit: www.intel.com/education/ISEF
- Education Sector Reforms (ESR) can be downloaded at: <http://www.moe.gov.pk/>
- World Bank ICT at a Glance, Pakistan can be downloaded at: http://devdata.worldbank.org/ict/pak_ict.pdf
- Enrollment data can be downloaded from UNDC Human Development Report 2006 at: http://hdr.undp.org/hdr2006/statistics/countries/data_sheets/cty_ds_PAK.html

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