

Professor Gelfand teaches that math can be interesting

By ELIZABETH APONE

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New Jersey's American Mathematical School by Correspondence is a bit unusual.

Like other correspondence schools, students receive and complete assignments by mail and then have papers returned to them with their mistakes corrected and explained.

Unlike other schools-by-mail, one of five instructors correcting the papers is Rutgers professor Israel Moiseyevich Gelfand, one of this century's greatest living mathematicians.

The creator of the correspondence school, Russian-born Dr. Gelfand is also the author of about 500 works on pure and applied mathematics, cell biology, neurophysiology and applications in medicine and other areas.

With such a wealth of published information, it might seem surprising that the correspondence school uses only four small mathematics books — in algebra, geometry, trigonometry and pre-calculus — for its instruction.

Dr. Gelfand explained otherwise:

"Math is very simple if you understand it. It seems too complicated because the high school student must learn, sometimes by heart, a lot of disjointed mathematical material. Math is actually only a few basic concepts which are then applied."

While the school currently has 200 students, Dr. Gelfand is optimistic about growth and plans a Midwestern branch in the near future.

"In three or four years we will have at least 4,000 students who will understand that math is interesting. The aim is not to be a mathematician. Math is a part of the human culture, any profession must understand the way of thinking," he said.

Dr. Gelfand is the recipient of more honorary degrees than he can remember, including honorary doctorates from Oxford, the Sorbonne and Harvard.

A member of many foreign academies, such as the Soviet Academy of Sciences, the Royal Society (London), Institute de France and America's National Academy of Sciences, he is also the recipient of many distinguished prizes, including the Kyoto Prize, the Wolf Prize and the Wigner Medal.

A former professor at Moscow University, Dr. Gelfand founded the first Russian correspondence school in Moscow 25 years ago as a way to provide mathematical instruction to students outside the cities who had little access to books and teachers.

As a new spirit of perestroika emerged in the Soviet Union, Dr. Gelfand was free to move to the United States in November 1990. He began the statewide correspondence school in September 1991 with the volunteer services of other professors and his wife, Tanya, and without monetary help from the state.

"We asked the state for money and they say, 'We don't know who this Gelfand is,' " he said, smiling. "They didn't give us money."

While a correspondence school might be suited to the Soviet Union where students often live in remote areas with schools of a low educational level, most students in the United States have access to the public school system.

Still, Dr. Gelfand sees a need for a correspondence school as a supplementary body to public schooling in light of problems with the current educational system.

When a large number of stu-



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Rutgers professor Israel Moiseyevich Gelfand, one of this century's greatest living mathematicians, teaches math by mail from his Highland Park home.

dents in a country must be taught, the system of teaching becomes "very inflexible" because it must be standardized and unified across the nation, according to the professor.

"If you try to improve it, it's very difficult. It has to be done on a very large scale," he said.

Dr. Gelfand also discussed loss of "the personal element" in communication and education, a casualty of the world-wide technical revolution of TV, radio and com-

puters.

"Teaching without the personal element is terrible. It must be individual. For this reason the school by correspondence is some slight beginning. We have a connection with a lot of students with different levels of knowledge. It's an additional system of feedback from the highest quality of specialists," he said.

Also, he had criticism for an educational system which stresses learning by rote memorization of

theorems rather than seeing geometry and other mathematical subjects as "a way to organize the world."

Offering no "quick fixes" for the nation's educational system, Dr. Gelfand gave only a parable of a kind king who noticed a blind man trying to cross a busy street. Concerned for the man's safety, the king issued a decree that all his subjects must help blind men who try to cross roads.

Unfortunately the decree had a problematic effect: subjects began forcibly helping blind men who had no desire to cross roads.

The more the king tried to improve the law and alter the wording, the worse the situation became, even though the decree was created with the best of intentions.

"So it is with education. I'm not like the king. I don't have any solutions. I can only explain the situation and what I personally am trying to do to help," he said.

At 78, an age when many would be resting on the laurels of past success, it is unusual for a famous professor to create and devote time to a school which as yet brings him no profit.

But then no one has ever used the word "usual" to describe Dr. Gelfand.

Born in a small Jewish town in the Ukraine, Dr. Gelfand completed only the equivalent of a 10th-grade education. Times were difficult for Jews under the Iron Curtain and the professor had to have several jobs to bring in income for his family.

At 16, he went to Moscow to live with relatives. Money was earned by tutoring high school students and working as a guard at the Lenin Library, where he also con-

tinued his education through books and seminars.

One evening a professor from one of Moscow's Institutes, an engineering school, noticed that the young library guard was reading a rather complicated mathematics book.

"At 18, I knew math as well as he did," said Dr. Gelfand. The "very kind" professor asked Dr. Gelfand to teach at the Institute.

Although he was teaching students older than himself, Dr. Gelfand became a very popular instructor known for his flexible teaching style. When he would substitute for other teachers, the students often complained they did not want their regular instructors to return.

Dr. Gelfand lived most of his life as a professor and mathematician in the Soviet Union, unable to leave or visit mathematicians in other countries, learning from them only what could be read.

At age 60, he was finally permitted to go abroad to Oxford University, where he received an honorary degree.

Dr. Gelfand vividly remembers his first taste of the world outside the Iron Curtain.

Staying in the home of the school's president, Dr. Gelfand recalled looking out the window at the lawn below, lush with green grass growing there since the school's start in the 16th century.

Such a sight was "just as a fairy tale would be," Dr. Gelfand said.

Although he traveled abroad several times between 1973-1977, the trips were abruptly halted for several years when government officials said he was travelling "too often."

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Dr. Gelfand

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Dr. Gelfand accepted the verdict, now quite used to preparing papers for foreign presentations he would suddenly not be permitted to attend. "As a Soviet citizen," the mathematician said he was accustomed to such disappointments.

In 1987, travel became easier and by 1990, Dr. Gelfand was able to move to the United States, teaching for a year at MIT and Harvard and now at Rutgers.

Dr. Gelfand enjoys Rutgers because he is able to work both in mathematics and cell biology. He also likes the fact that the scientific community at the college "cares more about science than prestige."

According to Dr. Gelfand, the United States diminishes the talented members of its scientific community by closely connecting science with competition.

Professors who produce extensive research in "popular subjects" are rewarded with grants and tenure while those who charter unusual or unaccepted territory are not, he said.

"If you must do a lot for competition, then you don't have time to look at the interesting problems."

He cited the British scientist, Dr. Alexander Fleming, discoverer of penicillin in 1929, as an example of someone who explored uncharted scientific arenas. According to Dr. Gelfand, the famous scientist was actually not a very prestigious professor because of his unorthodox ideas.

"I'm not sure he could have gotten a grant today because he couldn't explain what he was going to do. Yet he changed the whole world."

To scientists, Dr. Gelfand offered the advice that we must value science in a new way, as an "absolute value" and a part of the human culture and the human soul, not just a part of industry.

"The best achievements are coming from this view," he said.