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# WILL IRAN WIN THE TECHNOLOGY WAR

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Israel urgently needs a strategic plan to maintain the technological advantage over nations dedicated to wiping out the Jewish state.



*Students at Qazvin Azad Islamic University, west of Tehran, assemble a solar-powered Havin-2 vehicle for a test drive. (photo credit: ATTA KENARE / AFP)*

MILITARY INTELLIGENCE chief Maj.- Gen. Herzl Halevi bears a heavy burden. This “philosopher general,” as a *New York Times* journalist once called him, is responsible for tracking the deeds, words and even thoughts of Israel’s foes, alerting political and military leaders to potential threats. Halevi’s undergraduate degree is in philosophy.

He told the *The Times*, “Through the years, I used philosophy much in a practical manner... philosophers spoke about how to balance, how to prioritize...this is something I find very helpful.”

In an unusual closed lecture he gave on October 29 for Tel Aviv’s College of Management, the usually reticent and understated general, formerly head of the elite Sayeret Matkal commando unit and tabbed as a leading candidate to become the next chief of staff, said, “If you ask me whether we’ll have a war with Iran over the next 10 years, I’ll give you a surprising answer. We are already at war with Iran. We are having a technological war with Iran. Our engineers are fighting Iranian engineers today and it’s becoming increasingly significant.”

He told the daily *Haaretz* that he was pessimistic. “Today, we have the advantage. Iran is closing in on it. Since the 1979 Iranian revolution, the number of universities and university students in Iran has increased 20-fold, compared with three and a half times for Israel.” Enrollment in science, technology, engineering and math in Iran is skyrocketing, he said.

In other words – in this technology war, Israel is losing.

I read about Halevi’s speech just after reading two reports prepared

by my S. Neaman Institute colleagues at the Technion in Haifa comparing human capital in science and technology in Israel, Iran and Turkey. These reports update an earlier study done in 2011.

New data show that for Israel, in the past decade, science and technology university students per 1,000 persons remained constant at 14, while in Iran, that figure is 25, having doubled in 10 years. Between 2007 and 2014, the number of Israeli universities ranked (in the widely used “Shanghai” list) in the top 100 in the world in science fell from four to three, while Iran managed to place a university in the top 100 for the first time.

Iran has a staggering number of science and engineering college students – over two million, an increase of 161 percent since 2004. For the same period, the comparable number for Israel rose only 20 percent, to 107,000.

According to data of Thomson-Reuters, a global information company based in New York and Toronto, Iran has the world’s fastest- growing scientific output, measured by peer-reviewed articles in international journals. In December 2013, Iran put a monkey named Fargam (“auspicious” in Farsi) into orbit and returned him safely to earth. Rockets capable of launching satellites can also carry military payloads great distances.

Ironically, the economic sanctions imposed on Iran by the West appear to have been a major factor in Iran’s burgeoning science. According to the just issued UNESCO science report “Towards 2030,” “The sanctions... have accelerated the shift from a resource-based economy to a knowledge economy by challenging policymakers to look beyond extractive industries to the country’s

human capital for wealth creation... between 2006 and 2011 the number of firms declaring R&D activities more than doubled.” The UNESCO report notes that Iran ranked seventh worldwide for the volume of scientific papers related to nanotechnology.

I spoke to Dr. Daphne Getz, senior research fellow at Technion’s S. Neaman Institute, who led the preparation of all the 2011 and 2015 studies, and asked her about Iran’s rapid progress.

***The Jerusalem Report:** Four years ago, you and your team analyzed the Thomson- Reuters Web of Science database and showed how Turkey and Iran are closing the science and technology gap with Israel. The press reported this study widely. Now, four years later, you and your team have issued two new reports on the same topic, providing detailed statistical evidence. Was there any official reaction to your 2011 report? Are our political leaders asleep, or are they aware of the threat posed by Israel’s losing its technological advantage?*

**Getz:** “The report was circulated to all the relevant government ministries. I received responses from two ministries, Education and Defense. Education – from the Chief Scientist, who asked to meet with me, to discuss the possibility of requesting a study of readiness of high school grads for university science and technology studies, and how we can prepare them for such studies, in math, physics and computer science. In the end, owing to bureaucratic obstacles, no such study was ordered.

“I also heard from the Defense Ministry. I met with two senior officials of the ministry, who came to interview me regarding our findings. They told me that, in their unit, our report was compulsory reading. I was impressed that the data in it was taken very seriously, but they did not share with me the actions undertaken (or not undertaken) in response to the trends that we described.”

In the West, Iran’s Shi’ite Ayatollahs are widely mocked and scorned. Top of the list is the leader of the Islamic Republic of Iran, Ayatollah Sayyid Ali Khamenei. But Khamenei has decreed that Iran will turn into a major scientific power in the future and his book “The Bliss of Knowledge” (now out in English) is a road map showing how this will be achieved.

Can one imagine Rabbi Aharon Leib Shteinman, head of the Council of Torah Sages, playing a similar role, when ultra- Orthodox schools do not even teach math and science?

***The Jerusalem Report:** “In Israel, we tend to see our ultra-religious as anti-science. Their schools, for instance, teach math and science poorly or not at all. And we assume that Iran is the same. But Iran’s Supreme Council of the Cultural Revolution, led by clerics and ayatollahs, has announced: “The revival of the great Islamic civilization is contingent upon allout progress in science.” The ayatollahs, led by Khamenei, have actually been the driving force behind Iran’s progress in science. Do your data support the Supreme Council’s statement that Iran is indeed massively backing its science, technology and math programs with huge resources?”*

**Getz:** “In Iran, there is no contradiction between science and technology and religion – the opposite is the case. The religious leaders say that Islam is in favor of science and Khamenei, the supreme ayatollah, claims in his speeches that true Islam walks hand in hand with science and technology.

Ayatollah Mohammad Khatami, when he ruled, published in 2005 his vision for 20 years in the future – a road map for economic, political, cultural, and social development whose goal was to transform Iran into a nation with an economy based on knowledge rather than on petroleum. The investment in education and in universities is part of this plan, as are the goals for increasing gross expenditure on R&D as a percentage of GDP and the increase in national investment in R&D per capita.

These investments and supporting policies have led to an increase in the number of students in science and engineering; have stimulated scientific research, and have increased R&D output that finds expression in the steep rise in the number of scientific publications and in the improvement in their quality. In high schools, students are directed to learn scientific disciplines, and this results in achievements in examinations and impressive showings in international competitions in science. Our findings show that the strengthening of achievements in science that we identified in 2011 have continued to this day. Iranian universities not included in the top 500 universities in the world, according to the Shanghai rankings, today appear among the top 100-200 universities in the world in science and engineering.”

***The Jerusalem Report:*** “One of the most interesting indicators your

*studies provide is that of the Science Olympiads [The International Science Olympiads are a group of worldwide annual competitions in various areas of science designed for the four to six best high-school students from each participating country selected through internal National Science Olympiads.] Iran attaches huge importance to these Olympiads; Khamenei himself met with Iran's student contestants. You show that Israel's performance index in this contest for youths is far inferior to that of Iran and Turkey. What is this measure and is it really significant? Does it tell us something about how Iran prioritizes science? Is Israel truly trying its best to identify scientific talent very early and develop it?"*

**Getz:** “The International Olympiads in science compare the achievements of teams of four to six outstanding high-school students from various countries, who compete in math, physics, chemistry, and biology. If we take, for instance, the achievements of Israel, Iran and Turkey in the math Olympiad in 2015, the six contestants from Iran reached 7th place out of 104 countries, winning three gold medals, two silver medals and one bronze. Six contestants from Turkey came 20th, with five gold medals, and Israel's team placed only 40th, with one gold medal, no silver medals and one bronze.”

Getz drew my attention to Prof. Maryam Mirzakhani, a math professor at Stanford University born and raised in Iran, who last year became the first woman in the prize's 80-year history to win the coveted Fields Medal, described as the Nobel Prize for mathematics. Mirzakhani won gold medals for Iran in the Math Olympiads in 1994 and 1995, and later studied at Iran's Sharif University of

Technology There is another key area in which Iran has overtaken Israel – science policy leadership.

In his two years in office, Iran's President Hassan Rouhani has built a cabinet full of PhD technocrats. One of his youngest cabinet ministers is Sorena Sattari, 43, a mechanical engineer, vice president for science and technology. Sattari says he seeks to link science more tightly to the economy and claims he will imbue Iran with "entrepreneurial spirit. He doles out \$600 million yearly in low-interest loans to 1,650 start-ups, perhaps imitating Israel's Chief Scientist grants.

Sattari's counterpart in Israel is Minister of Science, Technology and Space Ophir Akunis, 42, whose degree is in Political Science. Akunis is young, ambitious, energetic – a rising star in the Likud party. But he lacks academic knowledge of the subject his ministry administers.

Contrast that background with Israel's first minister of science, Prof. Yuval Ne'eman, whose work on the classification of the basic particle known as the hadron should have won him a Nobel Prize, together with Caltech Prof. Murray Gell-Mann.

The "Towards 2030" UNESCO report notes that in Israel "there is a visible ageing of scientists and engineers in some fields, including physical sciences and engineering. The shortage of professional staff will be a major handicap for the national innovation system, as the growing demand for engineers and technical professionals begins to outpace supply."

Getz tells me what she believes should be done. We need an urgent



coordinated strategic plan, she says, linking the Economics, Education, Defense and Science Ministries to strengthen Israel's science and technology capabilities and to maintain the technological advantage over nations dedicated to wiping us out.

In Arthur Miller's play "Death of a Salesman," salesman Willy Loman's wife Linda pleads for more respect for her husband, "attention, attention must be finally paid..." Those ringing words apply strongly to the efforts of Iran, Turkey, Saudi Arabia, and other neighboring Islamic countries to close the science and technology gap with Israel.

Israel has many excellent think tanks, like the one at which I work. They alert Israel's leaders to areas of deep concern.

But are their data, words and reports falling on deaf ears, like the words of Linda Loman? Is attention being paid, even when the Military Intelligence chief himself forcefully sounds the alarm?

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