

# Female Pupils' Perception of Electrical Engineering

**Orit Hazzan**

*Technion – Israel Institute of Technology, Israel*

**Ayellet Tal**

*Technion – Israel Institute of Technology, Israel*

**Idit Keidar**

*Technion – Israel Institute of Technology, Israel*

## INTRODUCTION

Recent studies have focused on gender issues and women's underrepresentation in fields such as computer science, software engineering (Camp, 1997, 2002), and information technology (Varma, 2003). This article broadens the discussion to include the field of electrical engineering (EE), in which the underrepresentation of women is even more salient than in the aforementioned fields. For example, the percentage of female undergraduate students in the Department of Electrical Engineering at the Technion – Israel Institute of Technology (IIT), Israel's leading school of engineering, is less than 15%.

Although there are no easy solutions to the complex problem of attracting women to the field of EE, we argue that certain measures can nevertheless have an impact. Specifically, a partial solution might be to increase the awareness of female high-school pupils, first, to the very existence of the field of EE, and second, to its diverse nature. This article reports on an annual exposure day that aims to do just that. This event, entitled "Electricity in the Palms of Her Hands," specifically targets female high-school pupils who excel in mathematics. This exposure day, the title of which follows the words of a popular Hebrew song, gives the pupils a glimpse of the variety of subfields EE encompasses, and thus gives them a very different perspective on EE as well as a different image of the professionals working in the field.

Specifically, the article examines the perception of EE as expressed by high-school female pupils on two such exposure days. We focus on one main

observation: the change the exposure day induces on the pupils' perception of the profession of EE. Our study shows that, whereas in the morning of the exposure days, the pupils perceived EE to be a technical field and did not consider it as a major field of study, by the end of the days, the pupils were describing its multifaceted nature, and many of them perceived EE to be a profession that they might consider studying.

## BACKGROUND

### The Department of Electrical Engineering at Technion<sup>1</sup>

The Department of Electrical Engineering at the Technion is ranked among the top-10 electrical engineering and computer science departments in the world. It is the largest of Technion's departments, with 1,800 undergraduate students in four main study programs (electrical engineering, computer engineering, computer and software engineering, and electrical engineering and physics), and over 400 graduate students. The department is a center of excellence in both applied and theoretical research. Over 10,000 of the department's graduates hold leading positions in the Israeli hi-tech industries, and they comprise 70% of the chief executive officers and vice presidents of development and engineering in Israel.

## Women in Technion's Department of Electrical Engineering

The percentage of women studying EE at the Technion is relatively low. In 2002, only 12.3% of the department's undergraduates were women, and that ratio increased only slightly in 2003 to 13% and in 2004 to 14%. The existence of associations in several of the leading universities that aim to provide community, mentoring, and enrichment for graduate women students in EE reveals that a similar phenomenon exists in other universities as well (see, for example, the Women in Electrical Engineering [WEE] organization at Stanford—<http://wee.stanford.edu/index.php>).

At the same time, achievements of the female EE students are, on average, high. According to Professor Baruch Fischer, former dean of the department (1999-2003), women are equally capable of succeeding in EE studies as are men. "The low representation of women in the department results from the low awareness of what the department offers and what its research areas are, as well as the unjustified 'masculine' image of the profession of EE," said Professor Fisher in the *Technion Magazine* of winter 2004.

In the past 4 years, an attempt is being made to increase the representation of women in the Department of EE's undergraduate programs. The department decided to expose female high-school pupils to the richness and variety of subjects currently studied at the department, to its distinguished research laboratories, to career opportunities in EE, and to pros and cons of being a female electrical engineer. This decision materialized in the form of an annual exposure day entitled "Electricity in the Palms of Her Hands." During the past 4 years, about 400 female high-school pupils, from an array of Israeli high schools, attended these exposure days. During these days, the pupils heard lectures, saw demonstrations, visited laboratories, and met with female graduate and undergraduate students of the department.

### The Exposure-Day Format

Table 1 describes the exposure day's agenda. Dr. Ayellet Tal, the second author of this article, formally opens the event. Dr. Tal is a female faculty member of the Department of EE and head of the

Table 1. Exposure-day agenda

Hour	Topic
9:00-9:30	<b>Opening:</b> Dr. Ayellet Tal, an EE female faculty member, describes her research on computer graphics. Dean gives words of greeting. An undergraduate student describes her social and academic life in the department.
9:30-10:00	<b>Plenary talk:</b> Engineering and society
10:00-12:00	<b>Parallel activities:</b> Demonstrations and visits to the department's laboratories
12:00-12:30	Lunch break
12:30-13:30	A tour of the Technion campus
13:30-14:15	<b>Parallel activities:</b> Meetings with female alumni of the department
14:15-14:30	<b>Closing session</b>

exposure day's organizing committee. After the dean's greetings, a female undergraduate student describes her experience as a student at the Department of EE. The pupils then listen to a plenary talk on the interrelations among science, technology, engineering, and society. This plenary session increases the pupils' awareness of the facts that (a) women can succeed in EE, and (b) women are still underrepresented in the field of EE.

The exposure day then proceeds with two sessions of parallel activities conducted in small groups. During the first session, groups of about 20 pupils each visit several of the department's laboratories, hear talks, and see experiments. Each pupil is directed to activities and laboratories related to topics that are close to her own fields of interest.

After a lunch break, each small group of female high-school pupils meets a female alumnus of the EE department. These women alumni represent a wide range of areas in which an electrical engineer can develop a career following graduation. The objective of the meetings is to increase the pupils' familiarity with the actual work of electrical engineers in general, and to expose them to the personal stories of female electrical engineers in particular.

The main ideas emphasized throughout the exposure day are the following:

- **The Interdisciplinary, Multifaceted Nature of the Profession of EE and the Variety of Topics that it Encompasses:** In order to change the vague public image of EE, the exposure day deals with a variety of topics

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