



The Davidson Institute of Science Education: Building bridges between Science and People

Aurelie Lachish-Zalait¹, Yarden Ben-Horin², Oren Eckstien³, Zvia Elgali⁴, Yossi Elran⁵, Naama Bar-On⁶, Liat Ben David⁷

Abstract

The Davidson Institute of Science Education, the educational arm of the Weizmann Institute of Science, aims to enrich science education in Israel and around the world. Its wide variety of educational programs, target students and teachers as well as the broader community. Through its efforts, the Davidson Institute is dedicated to bridging the gap between the general public and the frontiers of science, as well as influencing the educational system and disseminating scientific knowledge.

The Davidson Institute coordinates the Weizmann Institute's educational programs aimed at the Israeli school system and the general public. In addition to targeting outstanding students and their teachers, the Davidson Institute's formal instruction also reaches youth-at-risk and underachieving students, as well as Israel's community of math and science teachers. Extracurricular activities include afternoon science clubs, science Olympiads and competitions, public science lectures, national and international science camps, annual events, and the Clore Garden of Science – an exclusively outdoor science museum. Providing science education programs for all ages gives the Davidson Institute a holistic approach of lifelong learning and a special understanding of the needs of the various segments of society. Weizmann Institute researchers and graduate students are actively involved in Davidson Institute programs.

In its activities, the Davidson Institute aspires to provide learning opportunities to a wide spectrum of target groups in an effort to reach as many people as possible. Activities are offered to constituencies ranging from young children to adults, Israeli and international youth, and students and teachers and from various socio-economic sectors. Many activities are geared toward communities in the geographical and social periphery of Israel, including members of the Israeli-Arab and Orthodox Jewish communities. Programs range from day-long and other short-term workshops to multi-year intensive courses; from very advanced content levels to popular science. Nearly 400,000 individuals—students, teachers, and members of the general public—participated in a wide range of activities last year, while more than 3 million unique visitors browsed the Davidson Online website.

Keywords: Science education, Skills, Knowledge, Students, Teachers, General public

Introduction

The 21st century is an era of ubiquitous, ever-expanding knowledge that is available and free for all. This places huge responsibility on each and every one of us. Logical, sustainable decision-making for the benefit of mankind, on both the personal and social level, are based primarily on assets of knowledge and skills stemming from one of the greatest achievements of mankind: the world of science.

Science equips us with the information and skills necessary to make complex decisions. Based on curiosity, Inquiry, evidence and critical thinking, science is the powerhouse of the advancement of human beings within the environment, and has become inseparable from every aspect of our lives [1]. The Davidson Institute of Science Education, the educational arm of the Weizmann Institute of Science, connects people from all realms of Israeli society to the frontiers of science, influences the Israeli educational system and disseminates scientific knowledge, in Israel and the global level alike.

¹ Teachers unit, The Davidson Institute of Science Education, Israel

² Students unit, The Davidson Institute of Science Education, Israel

³ General Public Unit, The Davidson Institute of Science Education, Israel

⁴ EdTech unit, The Davidson Institute of Science Education, Israel

⁵ Sci-ed. Accelerator, The Davidson Institute of Science Education, Israel

⁶ Evaluation unit, The Davidson Institute of Science Education, Israel,

⁷ CEO, The Davidson Institute of Science Education, Israel, liat.bendavid



Via development and implementation of a wide variety of programs in all major STEM areas, we target students, teachers, families and the general public, making the world of science and scientific thought accessible to everyone. Situated within Israel's leading and world-renowned research center, The Weizmann Institute of Science, most Davidson Institute activities are developed and implemented in close partnership with Weizmann researchers, and are accompanied by personal and social activities, creating a holistic, inspiring, state-of-the-art scientific experience.

Vision and Mission

The Davidson Institute's vision is that science will be a major, leading value on both personal and social level of Israeli society. To achieve this, our mission is to become a national and global beacon of excellence, innovation and leadership in all aspects of science education.

A Continuum of Networks

Five continuums were developed in the following areas:

Content – programs address all major STEM areas, including multi-disciplinary connections.

Expertise – striving to develop all levels of interest, from scientific literacy to high-level scientific knowledge.

Target audiences – addressing all sectors of Israeli society, including specific populations such as the Arab sector, the ultra-orthodox religious sector and others; and all age groups, from families with young children, students and teachers to the general public.

Innovation – state-of-the-art, innovative pedagogies and technologies are developed and implemented in programs combining formal and informal settings, for curricular as well as extra-curricular purposes.

Leadership – the Davidson Institute operates as a science education leader of creativity, sought by and leading partnerships with a wide variety of Israeli as well as global organizations, such as ministries of education, science and industry; international schools and NGO's; EdTech companies; and more.

It should be emphasized that each continuum works both in-depth and in a synergic fashion, creating a system of networks between the areas. Programs are accompanied by ongoing, formative assessment and evaluation, enabling restructure, adaptation and fine-tuning throughout development and implementation.

Development, Implementation and Dissemination: Examples

Empowering students: Where knowledge and self-esteem work together

The Students' Unit at the Davidson Institute promotes and nurtures science and technology education among elementary, middle school, and high-school children across the country. It develops various programs for individuals, classes and schools in collaboration with the educational system, from afterschool programs for academically outstanding teenagers to unique programs for youth at risk. Programs use science and technology twofold: to expand understanding of everyday life and phenomena, as well as to boost students' self-esteem and confidence [2]. This is done by unique teaching methods and materials, carefully developed and adapted to the needs and level of target audiences. The Unit's programs make the world of science accessible to students who perform at all levels through activities that cannot take place in schools, including introducing them to the frontiers of science by meeting Weizmann scientists and research students "in action", in their laboratories [3]. The unit reaches more than 70,000 students in Israel. Furthermore, through synergy with other Davidson Institute units, the students programs influence teachers and families as well.

Helping Teachers Excel: Excellent Teachers make Excellent Students

The quality of teachers is a critical factor in quality of students' education [4], particularly in the fields of science and technology. The Teachers' Unit performs a variety of activities designed to keep the teachers updated on the latest innovations and advancements in science, technology, and mathematics knowledge and instruction. It organizes disciplinary and interdisciplinary training programs, national and international seminars, workshops and conferences. Working in collaboration with other Davidson Institute units, the teacher's unit has developed and successfully implemented some state of the art programs in the physical and virtual sphere alike, that are leading change in the way science and scientists are



perceived. Reaching more than 3000 middle and high school teachers annually, these programs are implemented in collaboration with Israel's ministry of education and sought by other countries as well.

Science for the Public: bringing people together, nationally and globally.

The Davidson Institute's philosophy includes improving science literacy for all, aiming to stimulate enthusiasm and curiosity among youth and adults for science and scientific thinking. The Institute offers a tremendous variety of activities for different audiences of all ages, in almost every field of science. The *Clare Garden of Science* open-air museum enables more than 50,000 families and visitors annually to enjoy natural science phenomena with unique hands-on exhibits; Many of the programs take place at the Davidson Institute's campus, via its *Laub International Science Youth Village and laboratories* - a dormitory facility accommodating participants from Israel and more than 17 countries around the world in a wide variety of science experience programs. Combining games, tournaments, clubs and outdoor trips, these programs develop the understanding that science is a human activity for the benefit of mankind – all mankind.

The iScience Initiative: a new frontier

The 21st century includes a relatively new and meaningful media rich environment, which any participant seeking for innovation and leadership in science education cannot ignore: the World Wide Web. The Davidson Institute has established the *iScience* initiative– a holistic system of digital learning activities, online courses, apps, educational materials and hands-on virtual labs and videos, geared for teachers, k-12 students and families. In addition, the Davidson Institute has established *Davidson Online*: a unique “online science communication center” geared toward the general public interested in science and technology [6]. The site is part of the Davidson Institute's broad outreach to advance science literacy for all and is supplemented with social media posts and interactions with the public. Only 2 years after its establishment, the site boasts more than 3 million unique visitors annually, with an average of 4.7 minutes view per page. Articles are written by scientists, used in classrooms and by the academia, and cited by leading Israeli media (radio, TV and other news and social websites) as well as viewed by the general public.

Conclusion: Science Education – a strategic choice.

Ours is a rapidly changing world. Changes in resources of energy and materials, health issues, food availability and environmental changes are but few of the challenges we are facing every single day. In such a world, each individual must develop the means to face these challenges in a knowledgeable, responsible and sustainable fashion. This means investing in the development of an educated community that uses evidence-based critical thinking to solve problems and strive. Through science education, the Davidson Institute creates and leads a holistic, systemic approach, influencing the most important asset any society has: its people – the true powerhouse necessary for a better society.

References

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