Environmental Education for the Community

HEN FRIMAN[1*], IDAN HALABI[1], AMIT OCHAYON[2], IFAA BANNER[3], BOSMAT SHALOM-TUCHIN[3], YULIA EINAV[1,4]

Faculty of Engineering[1], Faculty of Sciences[2], Dean of Students Office[3], Dean of Students[4]
H.I.T - Holon Institute of Technology
52 Golomb St. P.O.B 305 Holon, 5810201
ISRAEL
*henf@hit.ac.il http://www.hit.ac.il/en

Abstract: - Improving energy efficiency is a priority for Israel's energy policy and demands not only efficient technologies but also energy saving through changes in consumer awareness and behavior. Due to the rising need for professionals and academics with a background and understanding in the environmental field, Holon Institute of Technology ("HIT") developed a new Renewable Energy program at the Faculty of Electrical Engineering and new action learning course Training "Green Ambassadors" in the Community at the Social Involvement Unit.

Key-Words: Electrical Engineering, Renewable Energy, Early Childhood Education, air pollution, waste, recycling, soil ecology, water.

1 Introduction

Climate change caused by anthropogenic emissions of greenhouse gases, mainly from the use of fossil energy, needs to be tackled effectively and urgently. The transition to Renewable energy and a low carbon Economy will take decades to implement and concerns every sector of the economy. Effective education for energy and environmental field necessary along with Improving energy efficient technologies [1, 2]. The Renewable Energy program at the Faculty of Electrical Engineering HIT, gives the students technical and practical aspects of energy use and energy efficiency. The program also deals with minimizing the environmental impacts of energy use, as well as with energy economy and environmental policy. The action learning course Training "Green Ambassadors" in the Community at the Social Involvement Unit at HIT focus in teaching environmental education in early childhood includes the growth of a sense of curiosity as well as appreciation of the beauty and mystery of the natural world. Education also includes developing problem-solving skills and developing an understanding and appreciation of the world around us. The goal of environmental education is to develop a population that recognizes environmental topics. Studies have shown that most individual positions are formed at a very early stage of life, meaning the teaching environment in early childhood is of great importance.

2 HIT – Holon Institute of Technology

HIT – Holon Institute of Technology was established in 1969 and became an independent public academic institution of higher education in 1999, certified by the Council of Higher Education of Israel. HIT focuses on the teaching of sciences, engineering, computer science and technology, management of technology and design. It also emphasizes multi-disciplinary theoretical and practical research of innovative technologies from a professional scientific, economic and cultural perspective. HIT trains highly qualified students in the realms of science, engineering, management and design, and plays an important role in their integration upon graduation into key positions within the industry. HIT aspires to quality and excellence in teaching and innovative research, and strives to introduce novel and unique cutting-edge teaching and research technologies. HIT also prides itself on its advanced academic achievements, application of innovative techniques and interdisciplinary professionalism that lead to creative teaching and new technologies. HIT aims to utilize the intellectual and professional potential of each and every student, so that they can fully integrate into the fast-paced technological world of today. Providing superior technological and scientific education enables HIT graduates to enter

key leadership positions in both the private and public sectors.

2.1 Faculty of Engineering

The last decades have been dominated by the rapid changes introduced by the technology revolution, which has a tremendous influence on our daily lives. Today we are facing a myriad of new challenges. Technology-based industry has matured in many ways and the required skills for future engineers are much more complex in a world where "machines/computers" execute many of the engineering tasks. Most of all, we are facing a new generation of sophisticated students, who were born into the digitized/multimedia world. The mission of the study program is to encourage and initiate academic development, through the development of new study programs and methods, while being responsive to the rapidly changing trends in the field. The proper education of the undergraduate students must also be a function of market needs and predictions of how technology will develop in the foreseeable future. In order to ensure that our graduates are well qualified to meet the future needs of the market, meticulous attention must be paid to maintain a high standard in the fundamental courses and impart practical tools and skills. It is also important to introduce a wide variety of new subjects. The aims and goals of the Engineering faculty are to provide the students with a rich and comprehensive study program, and keep the study program updated to meet the ever-changing requirements for engineers of the future, enrich the student's theoretical knowledge as well as teach practical and design skills and knowledge; adapt its teaching methodologies and techniques, focusing on understanding as a goal; enable students to achieve skills such as self-learning and to acquire expertise via practice by understanding constantly update the teaching methods and the study program maintain relationships with the various relevant industry sectors introduce the students to state-of-the-art equipment and facilities, for conducting experiments that reinforce their understanding of the theoretical and practical issues studied in the courses promote research in the various fields; and explore cooperation with other institutes in Israel and abroad.

2.1.1 Renewable Energy program

The Energy field is thriving, due to several factors: the world energy crisis, political trends that create a rise in oil prices and other environmental topics. All of these have brought upon us the emergence of new and fascinating fields dealing with Energy. The introduction of renewable energy sources to the electrical grid and the realization of the need to optimize the current network with modern tools, have both led to a new research field: The Smart Grid. The introduction of alternative (renewable) energy sources for the electrical grid and the realization that there's a need to improve and optimize the current network using modern tools, has brought upon a new research field called The Smart Grid. The Smart Grid field creates a new interaction among various disciplines. Its goal is to create an electrical grid that is controlled by computers that are inter-connected via a cutting edge communication network. This is an entirely new technological and conceptual revolution. Following the receipt of an award for research, funded by the Chief Science Officer of Israel, a research group and the renewable energy and smart grid excellence center were founded in HIT in June 2011 with the purpose of encouraging research and creation in the field of energy. At the heart of the center, the renewable energy and smart grid laboratory was established. The laboratory is equipped with state of the art equipment and experiments, including: photovoltaic energy, water energy, wind energy, fuel cells and smart meters and smart grid equipment [3].

2.2 Social Involvement Unit

One of the many goals of the Social Involvement Unit, which is a part of Dean of Students Office, is to promote social involvement of students and staff in the community. It also promotes weak applicants and students at the institute by offering mentoring, tutoring, emotional support, guidance to learning, and adjustments in school. Over the years, the unit has worked in many education and welfare arenas to promote immigrants, youth, and more. The Social Involvement Unit serves as a professional center to encourage and promote the social impact of students and staff and to leverage knowledge, expertise, and human capital for the benefit of the community through social involvement projects and course actions involving meaningful activities.

2.2.1 Action learning course

The action learning course is an academic course which combines academic learning with social activities. These courses deal with processes and social challenges, reveal different ideologies, and develop critical thinking and pragmatic ideas. Students receive course credits and a grade for being part of such course. Participating students enrol in courses that involve action and activities to engage

in the experiential learning process, thereby creating a dialogue and cross-fertilization between being taught in the classroom and experiencing the reality in the real world [4]. A learning experience includes meeting with social organizations, institutions, and state authorities and carrying out practical work with diverse populations. Through experience, students strengthen their academic skills, formulate ethical attitudes toward reality, develop professional and civilian perspectives, and realize how they can influence their surrounding in the present and hereafter.

3 Training "Green Ambassadors" in the Community

Advances in elementary school curriculums supply theoretical lessons about energy efficiency; such an approach does not hold much information according to the topic, indicating that younger pupils' level of knowledge is really depressed. In order to ensure effective learning about energy efficiency, students—especially younger age groups—must be taught utilizing a short piece of theoretical lesson that only offers the fundamentals and provides experiential experiments that illustrate scientific principles[5]. Based on a teaching activity that motivates students to analyze and research the subject of energy efficiency, it is possible to search for answers and solutions about the environment. Such activity gives even the weakest students the motivation to study the subject in a fun way [6] and allows the students to learn at different levels—namely, hearing, feeling, and sight—thereby providing them with a practical and theoretical understanding of the material that, by the end of the process, is stored in their long-term memory for future use in their everyday lives. After the lesson, the pupils become representatives among their family and friends circles. Such representation is a significant persuasive power related to environmental education for pupils' circles in their various institutions, making it possible to spread the knowledge and information to a big portion of the population in a short time [7].

Under the guidance and supervision of Dr. Hen Friman, "HIT" has built an innovative course that combines action and activities to increase the awareness and accessibility of the community in an experiential way [6, 8]. The end goal is to create "Green Ambassadors"—children with a high level of environmental awareness. This course is divided into two parts. The course methodology (Fig.1), first part, focused on frontal teaching, delivers knowledge from extensive environmental fields to students. The second part of the course shows how the theory becomes practical and concrete. At this stage, students are asked to introduce to the first- and second-graders of "Revivim" School in Holon a lesson of 90 minutes focused on presenting the environmental issues: Energy efficiency (saving), solar energy, energy conversion, air pollution, water pollution, waste, recycling.

In whole-class instruction, only one person can speak at a time, and shy or slow-learning pupils may be reluctant to speak at all. When pupils work in groups of two to four, however, each group member can participate extensively, individual problems are more likely to become clear and to be remedied, and learning can accelerate. With justification, co-operative learning has become widespread. Not only can it increase academic achievement, but also it has other virtues. By working in small groups, pupils learn teamwork, how to give and receive criticism, and how to plan, monitor and evaluate their individual and joint activities with others. It appears that modern workplaces increasingly require such partial delegation of authority, group management and co-operative skills. Like modern managers, teachers may need to become more like facilitators, consultants and evaluators, rather than supervisors (Fig.2).

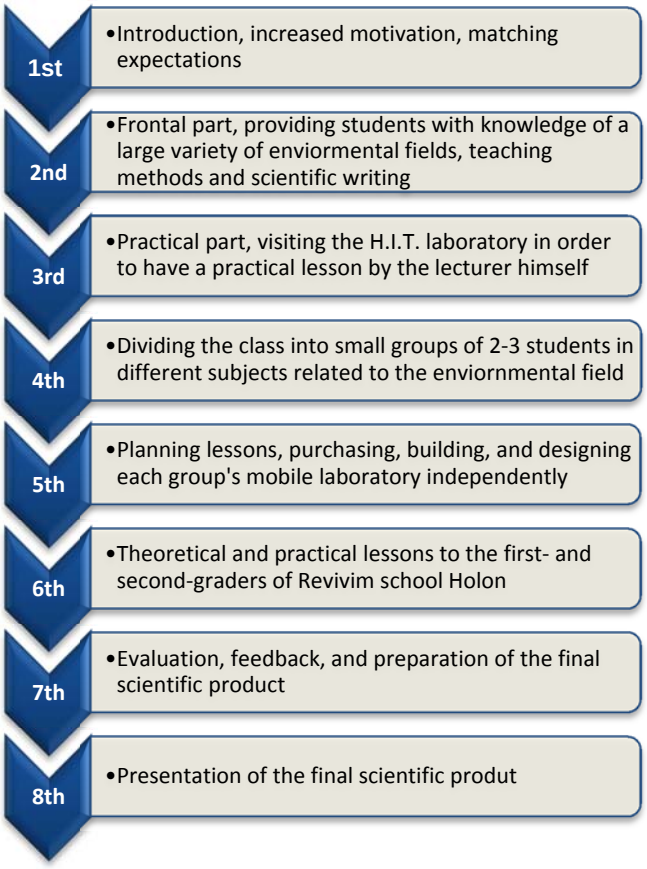

Fig.1: "Green Ambassadors" methodology

Fig.2: Presenting the principles

(up) Solar energy (down) Wind energy

These lessons serve as a milestone for the students, who can pass their knowledge on to the pupils. By the end of the course, the pupils have been authorized by HIT as "Green Ambassadors" and receive certification giving first- and second-graders the obligation to act in accordance with rules to increase renewable energy and energy efficiency and protect the environment, such as turning off lights when leaving the room, shutting all windows when the air conditioner is operating, opening the shades to let in sunlight instead of switching on lights, and turning off the water when brushing their teeth. In addition, pupils have to present and disseminate the importance of the issue to their surroundings. The last stage of the course is an efficiency test conducted by statistical examination of the students' answers to questions on the questionnaire presented to students as a related trivia game show.

3.1 Evaluation of teaching efficiency

The action learning "Green Ambassadors" course is experimental method of teaching, it is important to know the pupils appreciation for it. Each pupil fills an anonymous computerized feedback questionnaire at the end of the course. In this questionnaire they are asked about the overall satisfaction from the new experimental teaching method (Fig.3).

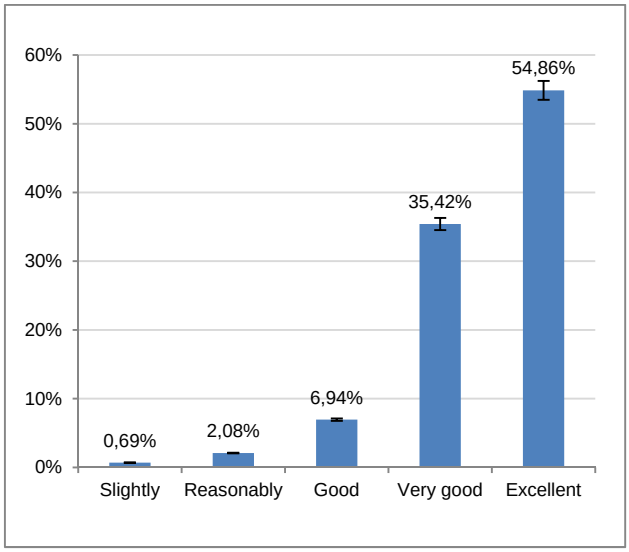

Fig.3: Pupil general satisfaction

4 Conclusion

This paper presents a new learning program at the Faculty of Electrical Engineering. The program gives the students technical and practical aspects of energy use and energy efficiency and also deals with minimizing the environmental impacts of energy use, as well as with energy economy and environmental policy. The action learning course Training "Green Ambassadors" in the Community powered by the Social Involvement Unit HIT that in this way we can contribute to society and future generations.

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