

MAKING ENVIRONMENTAL EDUCATION AND RENEWABLE ENERGY ACCESSIBLE TO THE COMMUNITY

Hen Friman^{a*}, Maxim Bandel^a, Netser Matsliah^a, Yafa Sitbon^b, Ifaa Banner^c, Yulia Einav^{a,d}

^aFaculty of Engineering, H.I.T - Holon Institute of Technology, Holon, Israel henf@hit.ac.il

^bDean of Students Office, H.I.T - Holon Institute of Technology, Holon, Israel

^cDirector of "Israeli Hope", H.I.T - Holon Institute of Technology, Holon, Israel

^dDean of Students, H.I.T - Holon Institute of Technology, Holon, Israel

ABSTRACT

Holon Institute of Technology (HIT) has developed an integral system of environmental education and training. The course is named "Green Ambassadors", and the goal is to educate the next generation environmental education. In the "Green Ambassadors" course, lesson plans were built that combine technological means, animation and videos alongside creative and experimentation activities- all these come to make learning meaningful and qualitative. In order to illustrate the topics studied by the pupils, the students used a moveable laboratory containing demonstrations, experiments and creative activities.

Through the experience, students strengthened their academic skills and values, formulated ethical attitudes toward reality, developed a professional and civilian approach, and understood how they could affect and influence their surroundings.

Keywords: Environmental Education, Elementary school, Renewable Energy, Energy Efficiency.

INTRODUCTION

How should children be taught about Renewable Energy? In the last 3 years students from the HIT, Holon Institute of Technology participated in a course "Green Ambassadors" which combines practical work. As part of the course requirements, students were asked to conduct enjoyable lessons within the topic of Renewable Energy and Energy Efficiency to pupils in the elementary school.

The students from various faculties: design, engineering, technology management, learning technologies and computer science studied the Renewable Energy and Energy Efficiency issues themselves and the material they learnt was passed enjoyably to the pupils of the school. Last year for the first time in the history of HIT the course worked in collaboration with an Arabic school, as part of a general trend in the college of multi-pluralism and cultural competence in the frame of "Israeli hope in the academia".

During meetings held within the school, the students taught the pupils via games and activities what Renewable Energy means, how to turn waste into a resource, what Energy Efficiency mean etc. In order to illustrate the topics studied by the pupils, the students used a moveable laboratory containing demonstrations, experiments and creative activities.

We describe the content of the course and how the knowledge obtained was passed on to young pupils using a creative, "hands on" approach which is more effective than traditional teaching methods in helping young pupils to internalize knowledge learned in the classroom and we show how successful the entire program was by assessing success in teaching others and the benefits obtained from this experience but also by assessing how much knowledge the pupils retained from these classes.

Thanks to all these, the pupils turned more aware and learned an important lesson about Renewable Energy and Energy Efficiency.

1.1. Holon Institute of Technology (HIT)

HIT focuses on teaching exact sciences, engineering, learning technology, technology management, and design. It performs theoretical and practical research. The institute trains scientists, engineers, managers, and designers. To prepare students for these positions, it promotes close cooperation with the industry, which also includes a curriculum guided by various factors in college.

Environmental involvement and contribution to the society are also reflected by the promotion of environmental protection. Consequently, the Ministry of Environment authorized the college as a green campus. In this context, activities are used to teach students about energy efficiency, including the recruitment of a given budget for scholarships and grants for students acting in the sphere of environmental community as well as courses involving

the community in providing theoretical and practical knowledge presented through exciting activities that highlight the importance of energy efficiency and the growth of green systems.

1.2. Social Involvement Unit

One of the many goals of the Social Involvement Unit 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.

1.3. Israeli Hope in the Academia

In the past decades, demographic and cultural changes are reshaping the Israeli society: It changed from a society constructed of a clear majority and minority to a society that is constructed of four central sectors or "tribes" that resemble in their size: secular; national-religious; orthodox; Arabs. In the light of this reality, a transition is needed from the common perception of "majority and minority" to a new one that is based on partnership between the sectors that construct the Israeli society. The Israeli president, in coordination with the planning and budgeting committee of the Council for Higher Education have launched "Israeli Hope in the Academia", since the academia has an essential role in shaping the "new Israeli order". The project's aim is to base the campuses as spaces for creating shared Israelite society that enables maintaining the unique identity of each group, to express the talents and excellence of the Israeli society, to promote a united vision of partnership in the universities and colleges, to develop an Israeli intellectual, social and diverse leadership that is aware and attentive [1].

Over the past few decades, demographic and cultural processes have been re-shaping Israeli society changing it from a society comprising a clear majority with several minorities to a society comprising four principal sectors or "tribes" that are similar to one another in size: secular, orthodox, Haredi (ultra-orthodox), Arabs. This new social structure is reflected in the composition of the current 2018 grade classes, where the Haredi and Arab educational streams together represent close to fifty percent of the total, indicating, in effect, a "New Israeli Agenda". In these circumstances there are no longer clear majorities and minorities in regard to basic ideological issues. We must, therefore, now move beyond the current approach of "majority and minority" and find a new approach based on partnership between the different population sectors that make up Israeli society (Fig 1).

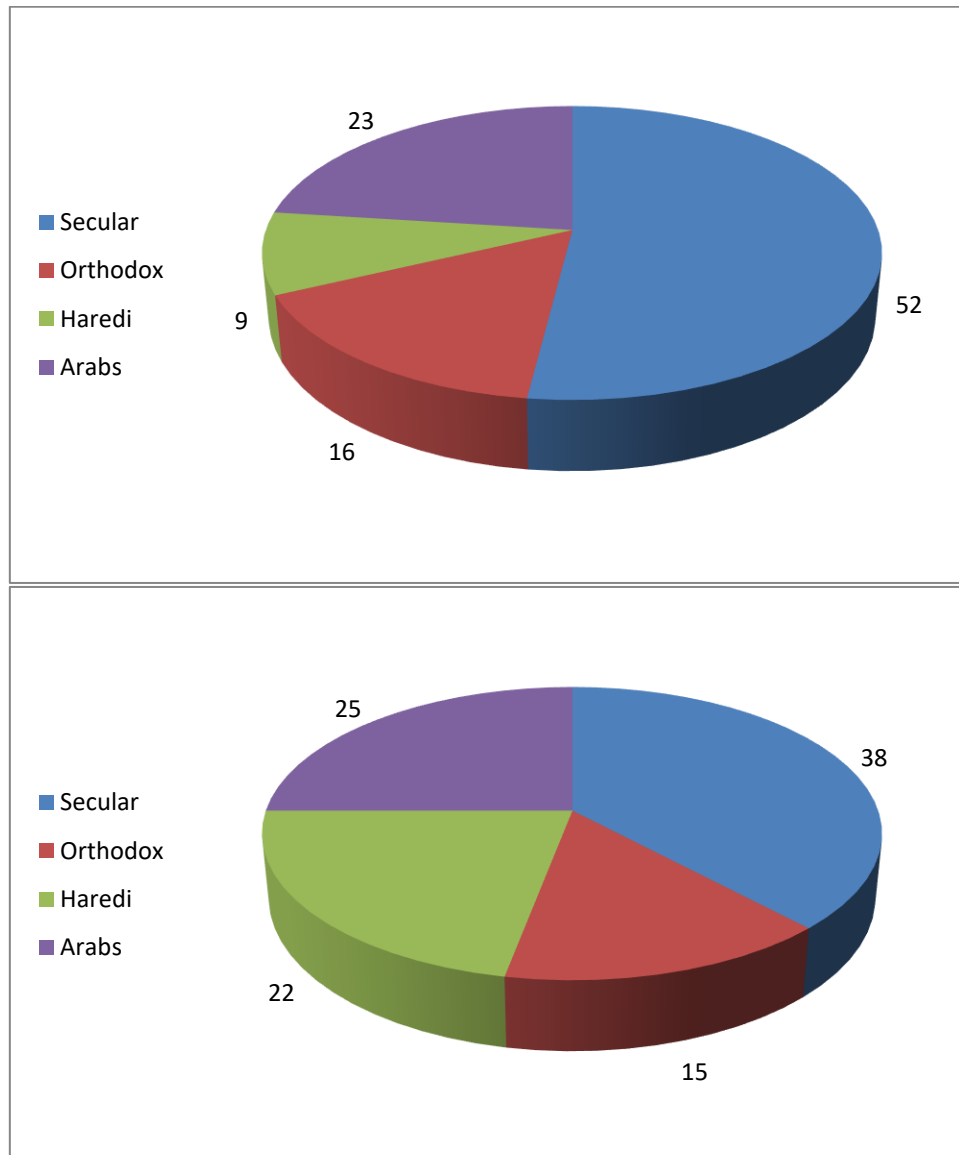


Figure1: Israeli society four sectors top graph describes 1990 and the bottom graph describes the year 2018[1].

2. The action learning course - “Green Ambassadors”

In 2018 under the principles of "Israeli Hope in the Academia" the course was taught to fifth and sixth grade pupils in the Arabic elementary school "Alomaria" situated in the city of Ramle. The course is named “Green Ambassadors” and the goal is to educate the next generation environmental education. The course is divided into 6 groups; each group contains 3 to 5 Israeli Hebrew speaker students, whose goal is to provide information on environmental to Arabic school with Arabic speaker pupils'. This article presents a new challenge. Teach environmental issues with language difficulties. Israeli Hebrew speaker students, teach environmental education in Arab school with Arabic speaker pupils'.

This course divided into three parts. First part, focused on frontal teaching, delivers knowledge from extensive environmental fields to students. In the second part the students, learnt from the pupils and the school's staff and got to know better the Arab society and its leaders. The three part of the course shows how the theory becomes practical and concrete. At this stage, students are asked to introduce to the pupils, lesson with language barrier focused on presenting the environmental issues: Energy efficiency (saving), solar energy, energy conversion, air pollution, water pollution, waste, recycling. The course included "mutual fertilization", the pupils acquired knowledge while the students got familiar with the Arab society in an informal and unprejudiced way

2.1. Meaningful learning theory

In teaching it is important to know how learners learn. If we teach in a connected and related way, most of them will learn properly. Otherwise learning difficulties may arise [2]. Novak has developed a theory of instruction that is based on Ausubel's meaningful learning principles. Meaningful learning: According to Ausubel, "the most important single factor influencing learning is what the learner already knows". Therefore meaningful learning, which implies longer retention than memorizing, occurs when humans relate new concepts to pre-existing familiar concepts. Then changes are produced in our cognitive structure, concepts are modified and new links are created. It is a useful tool because it enables real learning, it generates greater retention and it facilitates transferences to other real situations. To learn meaningfully, individuals must relate new knowledge to relevant concepts they already know. New knowledge must interact with the learner's knowledge structure. Meaningful learning can be contrasted with rote learning. Ausubel believed in the idea of meaningful learning as opposed to rote memorization [3]. The latter can also incorporate new information into the pre-existing knowledge structure but without interaction. Rote memory is used to recall sequences of objects, such as phone numbers. Meaningful learning involves recognition of the links between concepts; it has the privilege of being transferred to long-term memory. The most crucial element in meaningful learning is how the new information is integrated into the old knowledge structure [4].

2.2. Environmental Education

Most schools in Israel and throughout the world are appraised by their ability to transfer a large quantity of information to the pupils' over a 12-month period. As the amount of theoretical material is very large and the time teachers have to teach is minuscule, it is nigh impossible to ensure that pupils' understand the material during the lesson. Such an issue of teaching a lot during insufficient time causes teachers to develop certain teaching patterns during the inaugural years of their teaching careers. Such a pattern is built by training teachers during their teaching studies. When a teacher approaches the class for the first time, he/she uses this specific pattern. If such a pattern does not work, the teacher changes and improves it according to how he/she supposes it will be more efficient in class. The pattern holds in the teacher's mind and nature and defines a path to his/her future lessons [5]. As teachers face time pressures, it is difficult for them to change and modify this pattern. Due to the lack of time and erosion of teachers, teachers' lectures are delivered in a monotonous, tedious, and even destructive manner in terms of curiosity and resourcefulness of the child [6]. According to Ruth Wilson (1994), 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 [7].

And therefore it is very important to implement meaningful learning in the teaching of environmental issues, new information integrated into the old knowledge, is the key factors in learning in the classroom. Those principles should be taken into account to successfully meet Novak's concept mapping. Tasks carried out in the classroom, in which every learner is free to make a product and to show it in its own way. It should be noted that the teacher had previously decided the topic according to the curriculum, each learner chosen a product and had thought of the support and materials to be used. Each learner is supposed to do a product, considering its abilities. It is a try to facilitate the work by carrying out heterogeneous classroom activities. When learners do open works their learning is reinforced.

METHODOLOGY

The "Green Ambassadors" action learning course is an academic course which involves academic learning and social activities. The 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 courses. 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 [8]. 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 the hereafter [9].

"Green Ambassadors" course divided into three parts: First part, focused on frontal teaching, delivers knowledge from extensive environmental fields to students. In the second part the students, learnt from the pupils and the school's staff and got to know better the society and its leaders (Fig 2).

In the three part of the course, the theory becomes practical and concrete. At this stage, students are asked to introduce to the pupils, lesson with implement meaningful learning focused on presenting the environmental issues: Energy efficiency (saving), solar energy, energy conversion, air pollution, water pollution, waste, recycling

Brown (1992) found how examples and analogies can help student to remediate misconceptions in physics [10]. We show how games and activities together, Jewish and Arab for shared goal increased closeness and mediation. The course methodology included "mutual fertilization"; the pupils acquired knowledge while the students got familiar with the Arab society in an informal and unprejudiced way. There are several cases that described how Jewish and Arab teamwork increased exposure, closeness and mediation [11, 12].

RESULTS

"Israeli Hope in Academia" is a name of a program, designed to make the academic world more accessible to the diverse population in the state of Israel, with emphasis on the sectors that are less exposed to higher education. One of the means to achieve that goal is to create meaningful educational interactions between people from academia, and the younger generation of these sectors. For the last 3 years, students of various faculties in HIT, took part in a course called "Green Ambassadors", which was created as part of the "Israeli Hope" program.

In 2017 the program operated in the "Revivim" school in Holon, which belongs to the secular sector. In 2018, the course was conducted among the Arab population of the "Al Omariya" school in Ramle and in the last year 2019 the course was operated in a orthodox school "Yeshurun" in Holon (Fig 2).

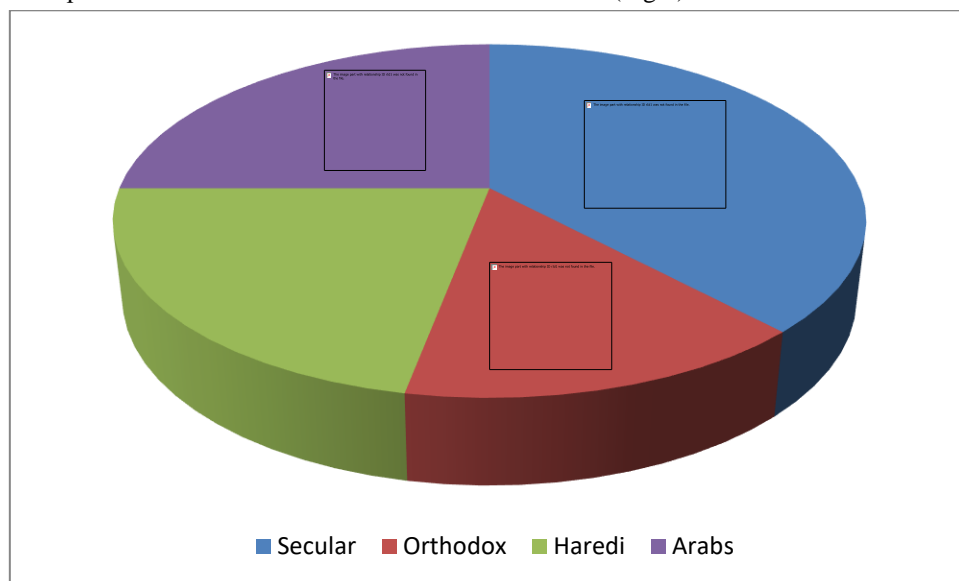


Figure 2 Implementation of the course in the Israeli four sectors according to the Israeli Hope Plan.

The participating students engaged in an experiential learning process that included creating a dialogue and cross-fertilization between what was being studied in the classroom and reality. Through the experience, students strengthened their academic skills and values, formulated ethical attitudes toward reality, developed a professional and civilian approach, and understood how they could affect and influence their surroundings.

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