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Research Article

MULTIDISCIPLINARY COURSE AT ENVIRONMENTAL SCIENCE

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ABSTRACT

Ongoing human activity in the industrial and agricultural fields has caused an increase in standard of living and quality of life. However, air, water and soil pollution following the accelerated economic development have caused a disruption of the delicate ecological balance and an environmental degradation.

Care for the environment, as well as preservation of nature and ecological balance, go back a long way, but it has only been since the mid-1960s that an accelerated development of environmental awareness and activities has taken place.

Environmental Science is of special importance for our existence nowadays. Hence, there is an obligation to impart it to the next generations, starting at an early age.

This article will review an action learning course at Environmental Science, as an applicable example of multidisciplinary environmental thinking.

INTRODUCTION

Over the years, there has been an increase in demand for electrical power. Such demands require the fossil-fuel power stations to burn more fuel. This causes heavy air pollution, which is detrimental the environment and our health.

The conclusion is clear, the world population must unite and make a paradigm shift in order to significantly reduce the damage for electrical power worldwide. Such an effort must be made by the entire world population and not just by individuals. A new multidisciplinary academy course has been set up at the Holon Institute of Technology (HIT). The course goal is to educate the next generation Environmental Science and energy efficiency. This course is the beginning of a paradigm shift regarding energy usage in the modern society in Israel. The objective of the course is to expand worldwide, in a wide scope to increase population awareness rate, both in Israel and all over the world, for a green future.

Multidisciplinary academy course at the Environmental Science - Training and Evaluation for Results is a course designed to provide competency-based multidisciplinary training pupils effective interventions and services. As a part of the course, the students from HIT give the school pupils several lessons, focused on energy efficiency and ways to save energy. Those methods are described and detailed using demonstrations of simple every-day actions, such as turning off the light when leaving a room and opening the shades in daytime. In order to demonstrate the subject in a practical and experiential way, the students use a mobile laboratory. The laboratory contains several demonstration kits on various subjects, such as renewable energy, air pollution, recycling, soil ecology and water sector.

Environmental Science at Early Childhood Education

These days, most schools in Israel and throughout the world are appraised by their ability to transfer a large quantity of information to the students 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 students 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

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lessons [1]. As teachers face time pressures, it is difficult for them to change and modify this pattern. Moreover, each individual is different, so many pupils fail to absorb the study materials-an aspect that affects the pupil later in his/her learning. 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 [2].

Donald A. Schön, father of the training systems and conceptual learning in organizations and communities, once said that "a practitioner's reflection can serve as a corrective to over-learning. Through reflection, he can surface and criticize the tacit understandings that have grown up around the repetitive experiences of a specialized practice, and can make new sense of the situations of uncertainty or uniqueness which he may allow himself to experience" [3].

Based on the 2012 results of the PISA commission, the Organization for Economic Cooperation and Development (OECD) recommended investing more effort and focus on the improvement of educational programs, teacher trainings, and a coherent system of teaching and professional improvement to enhance the quality of teaching and knowledge[2].

Accordingly, many researches have demonstrated that a large variety of teaching techniques have been developed for use with preschooler and first graders. Most research indicates that four- to six-year-olds have the highest concentration level during the first 20 minutes of the lesson, after which their level of concentration decreases drastically. In order to maintain a pupil's high concentration level, the instructor has to excite the students through experiential activities. Such efforts are intended to draw pupils out of their regular zone of reading, writing, or listening and induce them to exercise an activity of the same theme. Doing so violates the students' routine and allows the instructor to verify understanding through a game; thus, pupils can return to a high concentration level in order to continue and succeed in their studies.

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 [4].

Advances in elementary school curricula 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, separately 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. 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 [5] 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.

Holon Institute of Technology (HIT)

The Holon Institute of Technology (HIT) focuses on teaching exact sciences, engineering, educational technologies, 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.

Environmental involvement and contribution to the society are also reflected by the promotion of environmental protection. Consequently, the Ministry of Environment authorized HIT 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.

The 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.

Multidisciplinary Course at the Environmental Science

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 pupil's 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 – multidisciplinary course at the Environmental Science that combines action and activities to increase the awareness and accessibility of the community in an experiential way [8]. The action learning course is an academic course which combines academic learning with social activities (Fig.1). 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 [9, 10]. 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.

Evaluation of teaching efficiency

The multidisciplinary course at the Environmental Science 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.2).

Interviews with pupils in classes and teachers. "I did not know that the wind could be turned on"… "Now I understand why my mother keeps telling me to close the light in the room ..." said Tamar Schneiderman, a first grader pupil. The staff of the School also said in interviews that "the meeting of the young pupils with the students from HIT gave the pupils a different experience than what they are accustomed to on a daily basis" said Ronit Cohen, teacher. "The pupils were able to bring resources and formations we can't display routine, diversity has contributed greatly to the learning process of the pupils" said Tami Arush, teacher. When students were asked about the extent of the personal contribution of the course, Maor Kadosh, a second-year electrical engineering graduate studies said that the institute, are mainly engaged in natural sciences: physics and mathematics. In this course, he received new tools dealing with the worlds of ecology and ecology. For Maor, this is the closing of a circle to return to "Revivim" School, where he studied in his youth. Amit Levy, a second-year computer science student, said he enrolled in studies to develop his personal career, but as part of the "Green Ambassadors"

Fig 1 Presenting the principles (a) Hydroelectric energy (b) Solar energy (c) Wind energy (d) Energy from organic matter

course, he taught first and second graders and was exposed to community issues. DnialSrbi, second-year student in Management of Technology said that as part of a course "green ambassadors" She has the right to engage in teaching, whatever she thought she could get during the title. This experience was very experienced and meaningful for her and in her opinion may help her in the continuation of the professional path. An analysis of the results of the feedback shows that the students greatly benefited from the meetings with the students, learned a lot. The students noted that the pupils had a great commitment to the whole process. In addition, the institute noted that students are given the theoretical knowledge and the course were able to put it into practice and contribute to the community.

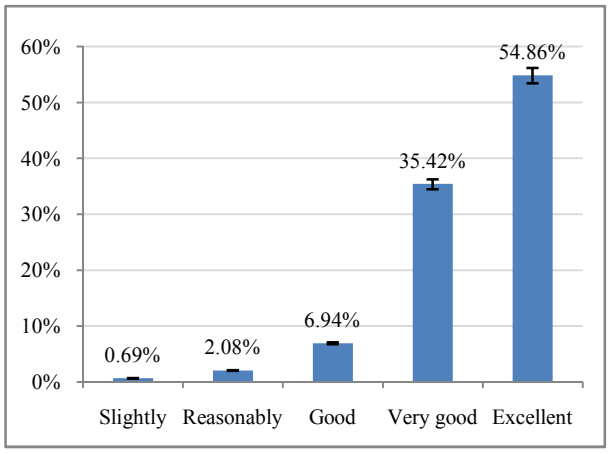

Fig 2 Pupil general satisfaction

In March 2017, 230 pupils from the "Revivim" School gathered at an impressive ceremony held at HIT Holon Institute of Technology, where pupils received the certificate - a child with high environmental awareness (Fig.3a).

Fig.3 (a) Pupils from the "Revivim" School received the Certificate
(b) HIT students get Certificates of Appreciation

The HIT students get Certificates of appreciation and appreciation for their great contribution to the success of the course (Fig.3b.) During the ceremony, Jocelyn Koren, principal of "Revivim" School, said that "Revivim" is a "green" school. The meetings with the students were meaningful experience sessions and aroused a lot of curiosity among the pupils".

CONCLUSION

The multidisciplinary academy course at Environmental Science that was powered by the Faculty of Engineering and the Social Involvement Unit at HIT is the way to contribute to society and future generations.

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