

Department of Science Education

A proposal submitted to the Executive Council
of the Weizmann Institute of Science
by A. de-Shalit
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Introduction

The impact of progress in science and technology on the everyday life of the average citizen is increasing steadily. New possibilities are opened up every day, and from time to time they are adding new dimensions to our life. Such was the case when man started sending missions to outer space, or when organ transplants became more common, or when computers started to be used in daily operations as an aid in the decision-making process.

These developments impose new responsibilities upon the people who make them. It is their moral obligation to ensure that those born into this new world which they help shape, are best prepared to live in it. The new developments in science and technology present numerous possibilities and challenges even to those who will only be using them without contributing to their further improvement; they pose new moral and social problems; they require the introduction of new values, and they call for the re-evaluation of old ones.

It is not surprising, therefore, that in many of the more developed communities much attention is being given to the transfer of knowledge about science from those who produce it to the broadest possible audience. The availability of more free time to the average worker and the increasing demands on re-training, in-service training, and refresher courses make this transfer of knowledge an activity directed not only at children but also at adults, all the way up to retirement age, each age-group with its own problems and needs.

It has long been realized that university teaching should be entrusted in the hands of those actually involved in the production of the knowledge they transfer. Only active participation in research can guarantee that the students will be receiving an up-to-date account of the state of the art. It has now become evident that the same applies, even though to a somewhat lesser degree, also to teaching at the high-school and elementary school levels. Much damage is being done by the continued propagation of old and irrelevant details, not to speak of the very many cases in which wrong things are being taught, only because the courses are prepared by people who, for many years, have themselves been out of touch with developments in their field.

The Science Teaching Center

About four years ago I took upon myself, at the request of the Minister of Education, to set up and chair a Committee charged with the task of making recommendations on the policy of science teaching in Israeli high schools.

The Committee drew on the previous experience and pioneering work in Israel of Professor Sh. Amitzur of the Hebrew University, who had been experimenting with new courses in mathematics. It was also greatly helped by studying some of the developments in science teaching in the U.S.A. and Great Britain.

Already in the early stages of the work of that committee it was felt that, unless its work was combined with an attempt to implement its recommendations it would wind up as just another report which would be added to the numerous previous studies and recommendations. An informal group was thus set up at the Weizmann Institute to deal with the preparation and introduction of new curricula in physics, chemistry and elementary mathematics, while advanced mathematics and biology were taken up by the group at the Hebrew University.

At a certain stage in this development I was able to interest the U.N. Special Fund in this programme and a possibility emerged to receive substantial support from them for our operation. This required the formalization of our activities, and a Charitable Company ("הקדש לענייני צדקה") was set up by Mr. A. Yadlin of the Ministry of Education, Professor A. Poljakoff-Mayber of the Hebrew University and myself, called the Science Teaching Center (המרכז להוראת המדעים). It is operated jointly by the Ministry of Education, the Hebrew University and the Weizmann Institute through the three people mentioned above. Through this center the Ministry of Education has channeled this year close to one million IL for the development of new science curricula for Israeli high-schools.

According to its by-laws, the Science Teaching Center is only a legal organization which serves as the recipient of funds made available for science education by various international and governmental agencies. Its management committee, composed of four representatives each of the Ministry of Education, the Hebrew University and the Weizmann Institute and chaired by the Deputy Minister of Education, is charged with coordinating the activities of the various groups and setting a general overall policy. The Weizmann Institute is represented on the management by Professors Sh. Lifson, D. Samuel, U. Haber-Schaim and myself.

Science Education and related activities at the Weizmann Institute

At the Weizmann Institute there developed, through the years, a number of groups engaged in science education and related activities.

The group directly connected with the revision of science curricula is centered around Professor D. Samuel (chemistry), Dr. Ch. Lifson (mathematics) and Ch. Harari and myself (physics). These groups are now helped by Dr. Ch. Braude in developing their experimental kits and in the general administration of their work. More than 15 teachers are working -- some part time and some full time -- on these projects, assisted by an office staff that varies from two to eight according to the load of work.

Two of the Institute's scientists are supervising the preparation of the programmes for the Instructional Television: Professor M. Feldman in biology and Prof. Ch. Harari in physics. The latter's work is done in close collaboration with our group working on the revision of science curricula in high schools.

Largely through the initiative of Mrs. M. Sela, the Institute has initiated and expanded a programme of science summer camps for high school children in Israel. This programme has been very successful and is about to be expanded to include also children coming to Israel from abroad for the summer.

The Institute has also initiated a yearly Science Models Contest that is intended to discover and encourage young talents in the various fields of mathematics and the natural sciences.

Through the initiative of Professor J. Gillis the Institute launches a yearly Mathematical Olympiad for teen-agers. The first year has aroused considerable interest in this new activity; if it continues, we shall also send our winners to an International Mathematical Olympiad.

Professor E. Katchalski, as President of the Israel Association for the Advancement of Science, has initiated at the Institute a number of afternoon science clubs intended for high school students from Rehovot and neighbouring towns and settlements. These science clubs, whose instructors are Institute Ph.D. students and junior staff, attract 100 students every year and are a source of great encouragement to many of them.

The Institute has also been involved, in various ways, in the promotion of the translation of popular scientific literature into Hebrew, in giving science-lectures to high school children and in other activities directed at a wider dissemination of science and science appreciation in Israel.

The success of this enterprise in the past can be attributed to two main factors: first, the scientists who devoted their time and imagination to it; and, secondly, the name and prestige of the Weizmann Institute in the country. The last factor has attracted many highly qualified teachers to the programme. Moreover, the fact that the Weizmann Institute is actively associated with the programme will no doubt be a source of encouragement and interest to many teachers all over the country.

Department of Science Education

It is proposed to set up at the Institute a full-fledged department which will centralize all the above mentioned activities and add others if necessary. Several advantages are envisaged as resulting from the creation of such a department over the present situation:

a. It will enable young scientists interested in this activity to graduate doing their doctorate in science education.

b. The contributions of the Institute in this area will have a greater impact on the country, thus not only aiding the programme, but at the same time adding to the positive image of the Institute in Israel.

c. It will make it possible to solicit funds available for the promotion of science education for an easily identifiable purpose.

d. It will enable us to hire people with academic training and experience as full time employees of the Institute engaged in science education and related activities.

Although the Department of Science Education, if created, will start its operations with only the sum-total of the presently running activities, it is envisaged that it could develop within the near future one or more of the following additional activities:

1. The establishment of a Science High School, with dormitories, on the grounds of the Weizmann Institute, and associated with it.

2. The extension of the revision of science curricula to include college education and education in foreign countries as well.

3. The development of special studies of educational toys and games and other items associated with the knowledge-industry, and the encouragement of such industries around the Institute.

4. The establishment of more extensive laboratories to serve science clubs, teachers' training centers, school demonstrations, etc.

5. The establishment of a Science Museum at the Institute.

Structure of the Department of Science Education

In order for such a department to be meaningful it must enjoy a status identical with that of other departments at the Institute. It must have its permanent staff and yearly budget backed by the Institute. It must have space set aside for it, and it should compete with the other departments for more budget, personnel, space and equipment according to the accepted tradition at the Institute, i.e., on the basis of its performance and of the availability of suitable personnel.

a. Regular appointments at the Institute; these will cover all the administrative and technical staff and some of the academic staff.

b. Part-time temporary appointments--mostly for teachers whose experience is essential for the projects involving curricula revision. Such teachers are also involved in the first actual test of the courses in schools.

c. Consultants, editors, translators, etc. hired for extra pay either from the Institute or from outside. Such people will be generally engaged for a specific task and paid accordingly. It is important to enable Institute employees to be engaged for these jobs from time to time without at the same time reducing their salaries in their own department at the Institute.

The Institute's involvement in this department will take the form of:

a. An establishment consisting initially of the corresponding fraction of the Institute's people who are at present engaged part time in these activities (Margalit Sela, Ch. Braude, Moshe Greenspan, H. Aharoni, I. Eisen, I. Efrati, D. Samuel, U. Haber-Schaim, Ch. Harari and A. de-Shalit) and an additional secretary and two technicians.

b. An initial allocation of the space at present occupied by the group at the Feinberg Graduate School.

c. An initial yearly budget of IL 100,000 which will be used, among other things, to carry out summer camps and related programmes.

d. The transfer to this department of all equipment at present being used for various science education activities.

e. The provision, free of charge, of all the services and supplies normally provided free to the departments of the Institute.

It is anticipated that this department will be receiving a number of contracts and grants. The present activity of the science curriculum revision group alone is supported by grants running at a rate of over half a million pounds per year. Since most of these funds are used for the hiring of part-time teachers, production of texts and laboratory equipment and the running of experimental courses in schools, it is suggested that the Institute charge a maximum flat rate of 10% for overhead on the contracts and grants of the Department of Science Education.

It is further suggested that special gifts made to this department be treated as customary at the Institute: once the gift and its purpose are approved by the management, it goes to the general funds of the Institute and the Institute assumes the responsibility of implementing the purpose of the gift.

It is also suggested that the budget item now called "Education/General Budget" becomes the Project Fund of this Department.

Personal Note

I have always felt a deep need to respond, in any way I could, to younger people who had an urge and curiosity to understand nature better. As a matter of fact I have always believed, and still do, that in a broad way this is the main mission of the Weizmann Institute. It is with this feeling that I offer my services to help set up this new Department. For many reasons I would prefer doing it, at least for the time being, retaining my affiliation with the Department of Nuclear Physics at the Institute; one of my earlier tasks will therefore be to find a more permanent chairmanship for this new department.

3. DEPARTMENT OF SCIENCE TEACHING

The Chairman said that this question had been raised at a meeting of the Executive Council in July. Prof. de-Shalit had subsequently prepared a detailed memorandum which had been distributed to all members of the Executive Council some time before. He asked Prof. de-Shalit to comment. The Executive Council had to make a definite recommendation on this to the Board of Governors the following week.

After Prof. de-Shalit had gone over the outline of his memorandum and proposal, he concluded that if the new Department were approved by the Board of Governors, he would try to set it up. He would probably look for someone else to head the Department, as such. He himself wished to continue his formal connection with the Department of Physics at the Institute; he did not think that he could be a member of one department and actively head another.

THE MOTION WAS UNANIMOUSLY PASSED TO SUBMIT
THE PROPOSAL TO THE BOARD OF GOVERNORS WITH THE
APPROVAL OF THE EXECUTIVE COUNCIL.