

TECHNION — ISRAEL INSTITUTE OF TECHNOLOGY

הטכניון · מכון טכנולוגי לישראל

THE S. NEAMAN INSTITUTE  
FOR ADVANCED STUDIES IN SCIENCE & TECHNOLOGY

מוסד שמואל נאמן  
למחקר מתקדם במדע ובטכנולוגיה



Report of the S. Neaman Institute Committee  
on the  
**Advancement of Teaching at the Technion**

Period of Activity  
November 1993 - June 1994

**Interim Summary Report**

Submitted to the Technion Board of Governors  
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## FOREWORD

The Committee for the Advancement of Teaching at the Technion began its activities in November, 1993. The prolonged strike of university faculty during 1994 has disrupted the Committee's plans to a certain extent, particularly with regard to institution-wide programs slated for implementation in conjunction with the Student Union at the Technion. Nevertheless, the Committee has managed to complete the majority of the tasks that it set for itself.

A detailed report summarizing the Committee's activities will be issued at the close of the semester. The aim of this summary report is to present to the Board of Governors the major findings and recommendations of the Committee.

We have endeavored to compose as exhaustive a document as possible, including the facts and details necessary for a full understanding of the Committee's recommendations and the reasons for their adoption. We hope that we have approached the optimum in this respect. However, we would suggest that those pressed for time direct their attentions to chapter 3, which includes the Committee's recommendations, while readers who feel the need for comprehensive background material and detailed explanations should avail themselves of the full report.

The Committee would like to take this opportunity to thank all those who gave of their time and energy so that they might assist us in our activities:

The administration of the Technion and, in particular, Prof. A. Solan, the President for Academic Affairs, who kept abreast of, and supported, the Committee's activities; faculty members, teaching assistants, and Technion staff who took the trouble to appear before the Committee and made important material available to us; student representatives, from whom we learned a great deal about the viewpoint of the "consumers of teaching" at the Technion; and, last but not least, we wish to thank Prof. D. Weihs, director of the Neaman Institute, and the staff of the Institute, who assisted in the Committee's activities under their auspices. A special thanks is offered to Mr. Amnon Frenkel who served as secretary of the Committee, and played an active role in all its activities, and Ms. Efrat Mazah, who assisted him. Were it not for the activities of the staff of the Neaman Institute, the Committee would have found it impossible to carry out the tasks with which it was charged.

# 1. INTRODUCTION

In recent years, the matter of enhancing the level of instruction has been raised several times at the Technion, primarily by the students, who felt an urgent need for rejuvenation and improvement. Student pressure, and a general feeling on campus that appropriate action needed to be taken, helped bring the subject before the session of the Students Committee of the Board of Governors in June 1993. The decisions of the Committee with regard to the above appear in the appendix to this report.

In accordance with the decision of the Board of Governors' committee, a Technion committee for the advancement of teaching was established, to operate under the aegis of the Neaman Institute. The members of the committee are:

David Chillag (Mathematics), Professor

Shimon Gepstein (Biology), Assoc. Professor

Nitsa Movshovitz-Hadar (Education in Technology and Science), Assoc. Professor

Mordechai Perl (Mechanical Engineering), Assoc. Professor

Aviv Rosen (Aerospace Engineering), Professor, Chairman.

The committee's duties were defined as:

- a. Examining various aspects of teaching at leading universities, including: teaching methods, organization of teaching, evaluation of teaching, methods of maintaining high teaching standards, methods of training faculty members (and teaching assistants) and increasing their motivation to teach well;
- b. Evaluating the situation at the Technion, based on the findings of (a);
- c. Recommending to the President of the Technion and the Vice-President for Academic Affairs ways of maintaining high standards of teaching at the Technion.

The Committee began operating in November, 1993. In accordance with its stated objectives, the Committee's activities have included the following:

- a. An extensive survey of existing literature was carried out, and relevant material was ordered from various overseas institutions. Our institution also initiated approaches to leading universities, which resulted in our receiving valuable material. The material

received was examined and analyzed by the Committee members.

- b. Faculty members (senior and junior) were invited to appear before the Committee or to convey their suggestions and comments. The Committee met with those faculty members who expressed an interest, in addition to examining the material relayed to it.
- c. The Committee met a number of times with student representatives. During these meetings, relevant issues were elucidated.
- d. The Committee formulated its recommendations, based on paragraphs (a) and (c).

Chapter 2 will present the major problems with regard to teaching at the Technion, as seen by the Committee. Chapter 3 will enumerate recommendations intended to resolve these problems. Chapter 4 will consist of a brief summary of this report.

## **2. PROBLEMATIC ASPECTS OF INSTRUCTION AT THE TECHNION**

### **2.1 General Overview**

Addressing the issue of instruction at an institution of higher education leads to the realization that it is very difficult to set precise boundaries between teaching and other areas, such as: faculty-student relations, student life on campus, curricula, and so forth. While the Committee endeavored to focus as much as possible on the limited topic of instruction, we learned that it is sometimes necessary to address the areas of overlap between teaching and other topics. These areas cannot be ignored, as their impact on instruction can be crucial.

The major problem lies in the "inferior" status of teaching as compared to research. This problem is shared by research universities throughout the world, and the Technion is no exception. Resolving this problem is a prerequisite for the upgrading of teaching as a profession.

The second problem relates to the connection between student and institution. When one analyzes the reasons behind student complaints regarding instruction at the Technion, it emerges that a great deal of these stem from "glitches" in the relationship between the student and various teaching-related systems within the institution. There is no doubt that attending to this problem can lead to a significant improvement in the quality of instruction, as perceived by the students.

The third problem is related to the second one, but the Committee opted to treat it as a separate issue due to its importance. The reference is to a phenomenon known as "first-year shock." While the members of the Committee were aware of its existence, all of them, without exception, were astonished at its severity, as expressed by students, faculty members and other functionaries at the Technion.

The fourth problem actually encompasses an overall examination of the means needed for the advancement of teaching at the Technion. These means are not available on the scale required for successful performance of the task at hand.

We will now offer a more detailed description of the four problems raised above:

## 2.2 The "Inferior" Status of Teaching

The Technion belongs to the group known as research universities, within which it enjoys a position of great respect. As a member of this circle, it is not surprising that the Technion suffers from various "ailments" common to the group. One of the more serious of these relates to the problem of teaching. During U.S. Congressional Committee hearings to consider the level of undergraduate science instruction in American universities, the following statement was made by the chairman, Congressman Thornton (emphasis is that of the Technion committee):

"Today, however, a nationwide perception exists that the *balance between teaching and research* has become skewed in favor of research and that the quality of undergraduate science education within this country has seriously deteriorated. Students and parents are alike in voicing their dissatisfaction with an academic system that sometimes seems to have lost sight of the educational needs of the students.

The *faculty reward systems* of universities give the appearance that faculty are awarded promotion and tenure primarily on the basis of research endeavors."<sup>1</sup>

Statements in a similar vein, made by presidents of the leading American universities, are widespread. Problems of this nature have also been raised within the higher education systems of other countries.

Moreover, the majority of faculty members are also apparently in agreement that the exclusive importance attached to research today harms the quality of instruction (as well as other areas of activity). As part of a survey conducted by E.L. Boyer under the auspices of the Carnegie Foundation for the Advancement of Teaching, a comprehensive survey was conducted among faculty members at various universities in the U.S.<sup>2</sup> The findings

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1 "The Quality of Undergraduate Science Education". Hearing before the Subcommittee on Science of the Committee on Science, Space & Technology. U.S. House of Representatives, 102nd Congress, Second Session. ISBN 0-16-038583-0. March 31, 1992.

2 E.L. Boyer, "Scholarship Reconsidered-- Priorities of the Professoriate," A Special Report. The Carnegie Foundation for the Advancement of Teaching, 1990.



indicated that 69% of the respondents at research universities felt that there was a need at their own institutions for other methods of assessing the "performance" of faculty members, besides publications. Some 53% were of the opinion that the pressure to publish impairs the level of teaching at their institution. For those bodies which have investigated the problem of teaching's "inferior status," there is no doubt that a proliferation of slogans about its importance will not solve the problem. It is only when the faculty member's investment of effort in teaching is rewarded, as it is with research, that we can expect to see a significant rise in the status of teaching at the research university. The president of MIT made the following statement at his appearance before the Congressional Committee cited previously:

"Promotion, tenure and salary setting must be designed to promote excellence in learning through education and research...Teaching and instructional innovation must be recognized and rewarded...."

The young faculty members at the Technion, who are preoccupied with problems of tenure and promotion, are no different from their counterparts the world over. They know that the best way to ensure their tenure and promotion is by focusing on research. Investing their efforts in teaching is "not worthwhile." Attempts to optimize one's personal advancement at the Technion frequently lead to the conclusion that the faculty members need only concern themselves with not occupying too low a position on the teaching "totem pole." Obviously, such an approach will not lead to the advancement of teaching as a profession.

To date, no significant steps have been taken at the Technion to alter the inferior status of teaching. Those efforts that have been made were of a declaratory nature, and did not constitute a clear signal to faculty members that there is a serious intent to change the situation.

## **2.3 Relations between the Students and the Technion**

The students are the consumers of the instruction offered by the institution. In recent years, we have been witness to an increase in students' dissatisfaction with the teaching that they are receiving at the Technion. Clearly, overenthusiastic adoption of the slogan "the customer is always right" within a university setting could be dangerous: an excessive attempt to fulfill students' expectations could well bring about a significant drop in the level of the institution (with subsequent damage to the students themselves). However, it is the

Committee's view that some of the problems cited can be addressed without harming academic levels. Attention to these problems can lead to a relatively strong improvement in the learning atmosphere and in the attitude of the students. The problem of student-Technion relations, with regard to teaching, can be divided into two subproblems:

### **2.3.1 Alienation between Faculty Members and Students (with regard to teaching)**

In too many courses, the students are under the impression that they represent a "nuisance" to their lecturers. In their opinion, many of the lecturers view teaching as a burden that distracts them from other activities of greater interest. The students feel, in many instances, that their requests and comments are not receiving due attention from lecturers or from high-ranking administration members within the various faculties (deans, assistant deans, coordinators of undergraduate studies). This perception on the part of the students leads to a deep sense of alienation between themselves and the faculty members. In many cases, this breach worsens with the passage of time, while in others, it rapidly escalates to a high level, where it remains until the conclusion of studies.

In the case of many of the lecturers, the students do not believe that they have a genuine desire to improve the level of instruction. This feeling on the part of the students leads to the development of negative learning patterns that ultimately lower the academic level of the graduates.

In many cases, alongside the alienation between faculty and students, there is also a sense of distance between the students and the providers of administrative services.

### **2.3.2 Student Workload**

The academic workload of students at the Technion is relatively high. This issue has been raised frequently in the past, and has been addressed several times over the years (in many faculties, there has been a reduction in the minimum number of points needed to earn a degree).

In discussions concerning the workload, the argument is always raised that reducing the burden is likely to lower the academic level of the institution, and consequently, the

quality of its graduates. Based on past experience, many faculty members even believe that a reduction in the academic workload will lead students to devote more time to paying jobs and other pursuits (instead of increasing the number of hours devoted to each subject). It should be noted here that the average Technion student is older than his overseas counterpart, is often married, and is obliged to support both himself and, possibly, a family. Prolonged military reserve duty often creates problems not encountered by students in other countries.

The students understand the complexity and the problematic nature of the workload issue, but their feeling is that in this instance, their voices are not being heard. Despite the fact that it is the students who suffer from the problem of excessive workload, it is rare for their opinion to be solicited or for a dialogue to be conducted with them on this matter.

## **2.4 First-Year Shock**

Although this problem relates largely to section 2.3 above, the Committee saw fit to indicate its magnitude by presenting it in a separate section. Despite their awareness of the problem, the Committee members were shocked by its severity, as expressed by students, faculty members and sources familiar with the subject.

Most students arrive at the Technion with a high level of motivation and a willingness to invest great effort in the learning process. This initial state is "shattered" when confronted with the reality of the first semester--a reality which consists of numerous courses, a heavy workload, large classes, lack of contact with lecturers, and a sense of disconnectedness, or lack of belonging.

It is worthwhile expanding on the last point. Most students come to the Technion to learn a specific profession (generally engineering). These students have certain expectations of their studies, based on their subjective view of the profession in question. During their first year, they are surprised to find themselves studying many basic subjects whose connection to their chosen profession is totally unclear to them. Most first-year students have no contact with the faculty in which they will be majoring. The bulk of their contact is with service faculties, towards which they feel distant, unfamiliar and alienated.

Faced with the situation described above, students rapidly lose their motivation. They learn to "survive," in part by developing study methods that meet the criteria for evaluation set by the Technion. The study patterns acquired by students during the first semester of the first year generally remain with them throughout their studies at the Technion. It appears that the damage caused by first-year shock is so great as to hinder the chances of improvement in subsequent years.

## **2.5 Tools Required for the Enhancement of Teaching at the Technion**

In order to enhance the level of instruction at the Technion, there is a need for a multi-pronged approach. Although most of the tools exist, in most cases they are not applied broadly enough.

### **2.5.1 Means of Assessing the Level of Instruction**

Any attempt to provide appropriate rewards for teaching (see subsection 2.2 above) must include an established process of evaluation of the faculty member's teaching skills. The only existing means of teacher evaluation at the Technion is the Best Lecturer Survey (Student Rating Questionnaire). Although this survey can serve as an important component of teacher evaluation, any attempt to rely solely upon this aspect would be wholly misguided, and unfair to faculty members.

Unless an acceptable and established mechanism for teacher evaluation is developed--none exists as yet at the Technion--the level of teaching will not be significantly enhanced.

### **2.5.2 Refresher Courses for Faculty Members and Teaching Assistants**

The Technion does not have an established mechanism for providing good, regular in-service training to new faculty members and new teaching assistants in order to develop their teaching skills. Apparently, the assumption is that an individual who has been a part of the educational system for so long, and has passed through its various stages (student, graduate student, researcher), has managed to "absorb" the knowledge needed to be a

good teacher. This assumption is without foundation.

Although we have witnessed attempts over the years to organize in-service training courses for new instructors at the Technion, in part thanks to the important activity of the Center for the Advancement of Teaching, there is no established tradition here such as exists at other universities.

The quality of this in-service training is extremely important. Despite the great need for such a program, it would obviously be inadvisable to offer courses of an inferior level. Poor-quality in-service training is far more damaging than none at all.

### **2.5.3 A Central Professional Body Dedicated to Improving Instruction at the Technion**

The Center for the Advancement of Teaching, established 20 years ago, has done a great deal to promote the issue. However, the Center, in its present format, cannot supply the full range of services required for significant improvement of instruction at the Technion. As the various faculties are incapable of housing the professional functions needed to advance the level of teaching, they would require the services of experts, to be provided by this central body. The Center for the Advancement of Teaching could obviously serve in such a capacity, following suitable expansion on its part.

### **2.5.4 Classrooms and Teaching Aids**

Many classrooms on campus are unsuitable for learning. This is particularly true of the lecture halls for large classes. Despite the ongoing improvement in teaching aids, considerable changes are still needed in many cases.

### **3. RECOMMENDATIONS FOR ADVANCEMENT OF TEACHING AT THE TECHNION**

#### **3.1 General Overview**

*Enhancement of the status of teaching at the Technion in no way signifies a downgrading of the level of research at the institution.* At a technological and scientific institution of higher learning that is preparing its students to perform the technological revolutions of tomorrow, one obviously cannot speak of suitable instruction that is not accompanied by, and combined with, advanced research. Improvements in teaching at the Technion can undoubtedly contribute to the advancement of research by improving the quality of students at the bachelor's level, who will in turn be among the dominant factors in the promotion of research at the institution as they continue their studies towards a master's or doctor's degree.

The recommendations submitted below relate to the four problems presented in section 2.

#### **3.2 Improvement in the Status of Teaching at the Technion**

##### **3.2.1 General Overview**

*Without a change in the relatively inferior status of teaching at the Technion, it will be impossible to ensure significant advancement.*

The recommendations of the Committee with regard to improving the status of teaching consist of long-term recommendations (whose implementation must be undertaken as soon as possible), and short- and medium-term recommendations, which can be executed within a relatively brief time frame. The long-term recommendations relate to a fundamental change in the way of thinking on campus with regard to the duties of faculty members and the faculty evaluation process. The latter group of recommendations is intended to provide a clear signal to faculty members that a change has taken place in the attitude toward teaching. Implementation of the short- and medium-term recommendations will also aid in realizing the long-term recommendations.

### 3.2.2 Long-Term Recommendations

#### 3.2.2.1 General Overview

The duties of university faculty members are commonly considered to include three different components: research, teaching, and service to the community. There are those who divide the community service aspect into services within the university itself (tasks, committees, etc.) and external services (national committees, support for other educational systems, etc.). At the Technion, as in other research universities, a faculty member is currently judged, almost entirely, on the narrow basis of research. Thus it comes as no surprise that faculty members at the Technion invest the bulk of their efforts in research, while to a certain extent neglecting other activities. In order to alter this situation, a significant change must be effected in attitudes towards teaching. Such a change must lead to a system that also appreciates and rewards faculty members for their teaching performance (in addition to the rewards for research and other pursuits).

#### 3.2.2.2 A New and Expanded Definition of the Faculty Member's Role at the Technion

If we start with the assumption that assessment of faculty members' contributions must be based on a definition of their duties, as well as the expectations placed on them, it would only be fair to note that the definition of a faculty member's responsibilities was, until recently, extremely narrow and mostly uniform in nature. It is difficult to quantify the subject, but it is the feeling of the Committee that some 90% of a faculty member's activity revolves around the performance of advanced research, limiting his other functions to the remaining 10%. Some degree of change took place recently, with the Technion Senate's adoption of a resolution pertaining to faculty members in the field of design. In this case (although this was apparently not stated explicitly), the faculty member is expected to make a much greater contribution to the teaching and promotion of design-related subjects (while reducing his research activities).

In order to enhance instruction, it is necessary to introduce *flexibility in the definition and scope of faculty members' duties*. An institution that trumpets the need for upgrading the quality and status of teaching--obviously, alongside the promotion of research and other activities-- must come to realize that the range of activities engaged in by its faculty members need not be uniform. Naturally, in the case of a research university that strives for excellence, such as the Technion, we must

ensure that such flexibility does not open the gateway to mediocrity. In light of the above, the Committee feels that if the full responsibilities of a faculty member are viewed as totalling 100%, it is possible to conceptualize a flexible system in which research occupies the 50%-90% range, teaching--10%-50%, and community service--0%-40% (obviously, those with special responsibilities, such as members of the administration and deans, can deviate from the above in the course of their duties). At first glance, this proposal is likely to appear quite daring and difficult to implement. Nevertheless, it should be recalled that faculty members involved in teaching design, who are already on campus, actually represent the first step towards the proposed flexibility.

Every faculty member must construct his own job description in cooperation with the dean of the faculty, while balancing various factors such as the faculty's needs, and his own hopes and inclinations. The job description will be determined for a period of several years, and the achievements of the faculty member during this time will be assessed on the basis of the original description. Naturally, the composition of the job can change over the course of the faculty member's career, in accordance with changes in his or her areas of interest and the needs of the faculty and the Technion.

The Committee believes that even after the introduction of this flexible approach, the average faculty member on campus will devote most of his efforts to research. Nevertheless, this method will facilitate the activities of those faculty members who channel increased effort into teaching, in accordance with the needs of the faculty and the Technion.

It should be noted that the concept of flexibility in defining the range of faculty members' responsibilities has been proposed by various overseas bodies, as a solution to assorted problems (including teaching) of the research university. A number of universities have begun to implement the approach at various levels.

The full report of the Committee will include a more detailed treatment of this recommendation. As indicated above, implementation of the recommendation will necessitate a lengthy process. Nonetheless, it is advisable to begin implementing parts of the recommendation in the near future.



The recommended steps include:

- \* *Establishing a committee to examine the matter of a new and expanded job definition for Technion faculty members. The Committee will examine similar programs worldwide, and will recommend a format suitable to the Technion (in this instance, there are important aspects to be considered, beyond the narrow area of teaching).*
- \* *Examining the possibility of implementing the approach at the Technion on a limited basis (individual faculties, simulation based on past cases, and so forth), in light of the recommendations of the Committee, and in conjunction with it.*
- \* *Drawing conclusions from the limited application, and formulating a method of overall implementation at the Technion.*

### **3.2.2.3 Development of a Reliable Method for Evaluation of Faculty Members' Teaching Skills**

Any attempt to improve the status of the teaching profession at the Technion must be accompanied by suitable rewards. In order to provide such rewards, an established system for the evaluation of faculty members must be instituted.

Over the years, a method of assessing the research work of faculty members was developed at the Technion. By contrast, only one mechanism exists for evaluating the level of instruction of an individual faculty member--the Best Lecturer Survey. While such a survey can serve as an integral component of a faculty member's evaluation, the experts are unanimous in stating that it should not be the sole means of measurement.

The issue of teacher evaluation has earned widespread attention in recent years. A rich body of literature has been published on the topic, and it would be advisable to create a professional body at the Technion that would specialize in this area and provide guidance to the various faculties (see section 3.5.2). It appears that teacher evaluation must involve several tools in combination, including: a survey conducted among the students, detailed evaluations by students, alumni evaluations, peer review, self-evaluation, etc. Numerous examples of such systems can be found at leading universities. The actual process involves the creation of a "teaching file" containing an

overall evaluation of the faculty member. It should be stressed that it is important in such a situation to create as precise a mechanism as possible, and one that will operate in accordance with guidelines that are understood and accepted by faculty members.

The recommendations in this case include the following stages of activity:

- \* *Establishing a committee of experts that will study the topic of teacher evaluation and examine the wealth of published material, past and present, in this area. The Committee will formulate an approach suited for evaluating the level of instruction of faculty members at the Technion.*
- \* *Considering limited application at the Technion, in light of the recommendations of the committee of experts, and in conjunction with it.*
- \* *Drawing conclusions from the limited application, and implementing the total plan at the Technion.*

#### **3.2.2.4 Suitable Reward of Faculty Members for Teaching**

*Based on execution of the steps enumerated in sections 3.2.2.2 and 3.2.2.3, faculty members should be rewarded for achievements in teaching. Such rewards should be expressed in the following areas: tenure, promotion, financial benefits, and the like.* The creation of the impression on campus that the reward for achievements in teaching is somehow less "respectable" than that for achievements in research is to be avoided at all costs.

### **3.2.3 Short- and Medium-Term Recommendations**

#### **3.2.3.1 General Overview**

The recommendations for the short- and medium-range are intended to provide a clear signal to the campus of the change in attitude with regard to teaching. These recommendations will be enumerated below.

### 3.2.3.2 Dean of Teaching

*A senior faculty member, known and respected on campus, shall be appointed to the post of Dean of Teaching.* His duties will include:

- \* Ongoing follow-up and supervision in teaching-related matters at the Technion (see also subsection 3.2.3.3).
- \* Activities and innovations aimed at enhancing teaching at the Technion.
- \* Acting as a senior authority in the implementation of the long-term recommendations, as described in section 3.2.2.
- \* Creation and administration of a rapid and efficient mechanism for communication among lecturers, faculties and students, in all areas related to teaching. Such a mechanism would ensure quick attention to problems, in order to prevent their exacerbation.
- \* Maintenance of ongoing contact with deans and other faculty administrators in all areas related to teaching, including the receipt or "supply" of teaching services.
- \* Responsibility for the bodies providing teaching services at the Technion (such as the Center for the Advancement of Teaching).
- \* Preparation of an annual report to be submitted to the Technion administration, on the state of teaching at the Technion, and the enhancement of its quality and status.

### 3.2.3.3 Teaching Budgets

*Special budgets will be allocated for the advancement of teaching at the Technion. These budgets will be overseen by the Dean of Teaching.*

These budgets will serve the following objectives:

- \* Financing of special projects in teaching-related topics. The various faculties will submit proposals for special projects whose purpose is to enhance teaching, e.g., development of new teaching methods, compilation of textbooks, development of teaching software, and so on. Several faculties could also submit joint proposals. The Dean of Teaching will determine the budgets' distribution, and track the implementation of the projects (in the case of multi-year projects as well). The financing can include salary bonuses for faculty members.
- \* Suitable prizes to be given to faculty members for excellence in teaching, or for the initiation and development of successful and outstanding teaching projects.

- \* Prizes for articles on teaching-related topics. There are numerous periodicals devoted to various aspects of the teaching of engineering and science and related fields. In addition, it is common practice today for conferences and professional publications to devote space to various aspects of teaching. Technion faculty members are infrequent contributors in these areas, apparently due to their lesser weight in faculty member evaluations. Publication of such articles can be encouraged by the awarding of prizes for outstanding submissions.

#### **3.2.3.4 Faculty Teaching Coordinator**

*The Committee recommends considering the option of appointing a teaching coordinator for each faculty.* The intention here is not to create a position paralleling that of the department director for undergraduate studies who presently operates in each faculty (known in some cases as the assistant dean of undergraduate studies). While the person in charge of undergraduate studies within each faculty is generally a faculty member with the status of associate professor at most, the new position would be staffed by a full professor who would handle teaching-related issues and would be the faculty counterpart of the Dean of Teaching. The duties of this faculty member would include initiating activities to improve instruction within the faculty, and tracking such activities. The teaching coordinator would have ongoing contact with the Dean of Teaching, and would submit to him an annual report on faculty activities aimed at enhancing instruction at the Technion. The faculty teaching coordinator would also serve as an address for student complaints and input in all teaching-related matters within that faculty, and would maintain ties with other faculties that "supply" teaching services to that faculty.

### **3.3 Recommendations for Improved Relations between Students and the Institution with Regard to Teaching**

#### **3.3.1 General Overview**

Improved relations between the students and the institutional apparatus of the Technion can have a significant impact on two levels:

- \* By leading to feedback from the students, which can help improve the level of teaching. Such feedback is seriously impeded in cases of bad relations between students and the system.
- \* By leading to a better feeling among the students, which would in turn create a more positive learning atmosphere.

In order to achieve the results noted, the Committee recommends several steps.

### **3.3.2 Student Participation in Faculty Curriculum Committee**

*The Committee recommends that students will occasionally participate in the Faculty Curriculum Committee (FCC). The students would not serve as permanent members of the FCC, and would be invited only to those sessions dealing with topics that pertain to them.*

We recommend that a joint meeting with the participation of student representatives take place at least once each semester. An attempt would be made to include students from different years. The FCC would submit various topics for discussion, and the students would be permitted to propose their own issues, grouped together on one list beforehand. Following the meeting, the student representatives would distribute a notice to all students of the faculty, detailing the issues raised as well as those decisions and explanations of interest to the students.

### **3.3.3 Ensuring Regular Functioning of Individual Faculty-Student Committees**

The Departmental Faculty-Student Committee deals with a wide range of topics. While some of these are unrelated to teaching, most have significant connection to it. This Committee serves as an important mechanism for creating a positive relationship between faculty and students. *Consequently, the Committee recommends that every effort be made to ensure the regular functioning of the faculty-student committees, and even to step up their activities, where possible.* At the same time, the Technion Faculty-Student Committee (serving the entire Technion) should, of course, continue its much-needed activities.

### 3.3.4 Report to the Dean of Teaching

*The faculties will issue reports to the Dean of Teaching on the activities recommended in subsections 3.3.2 and 3.3.3.* The Dean of Teaching will utilize these reports for purposes of follow-up in the area of faculty-student relations.

### 3.3.5 Examining the Issue of Student consultation

In its pursuit of ways to improve faculty-student relations, the Committee also addressed the issue of consultation. Compulsory consultation sessions, such as were held at the Technion years ago, could serve as an excellent means of creating a strong, positive bond between faculty members and students. Consultation services would be based on a personal connection between a given student and faculty member, with the student feeling that he has someone to turn to with any problem in relation to teaching or learning.

One of the chief reasons for discontinuing the provision of consultation at the Technion was the fact that the consultation sessions often turned into a process totally unrelated to the original intent. In such cases, students received the impression that they were a nuisance to the advisors, whom they perceived as trying to avoid meeting with them. Students in need of consultation services often felt humiliated and rejected.

*As a means of improving faculty-student relations, the Committee recommends that careful consideration be given to the possibility of reinstating consultation for students.*

Care should be taken to avoid repeating past mistakes. Since personal consultation is a weighty responsibility, and one that is apparently difficult to carry out properly, intermediate methods should be looked into. For example, a system could be considered whereby a counselor (or several, in the case of large faculties) would be assigned to students starting a given semester. This counselor would be assigned to them for the duration of their studies at the Technion, and would meet with them every semester. Group meetings initiated by the counselor would be held for purposes of conveying information and receiving feedback from the students.

Interested students could turn to the counselor when they felt the need; likewise, the counselor would be able to call students into his office. Efforts should be made to see to it that only suitable faculty members are appointed as consultation counselors. Since consultation duties are time-consuming, this additional burden on the faculty member should be taken into account, possibly by exempting him from certain other tasks and/or providing appropriate rewards.

### **3.3.6 Improvement of Bureaucratic Procedures**

In addition to alienation between faculty members and students, the latter complain of distance between themselves and certain of the office staff who handle teaching-related matters (in the undergraduate studies program). *The Committee recommends that the various faculties, in conjunction with the students, examine ways of improving the office services provided to students. A similar review will also be carried out at the main offices in the Ullman building.*

### **3.3.7 Appointment of a Student Representative for Teaching Matters**

*The Student Union will appoint a student to handle teaching-related matters, in conjunction with the Dean of Teaching.* The person filling this position would be an active link in the communications pipeline between the Dean of Teaching and the students. If necessary, he could also undertake to appoint student liaisons from the various faculties.

## **3.4 Recommendations for Reducing First-Year Shock**

### **3.4.1 General Overview**

The recommendations for reducing first-year shock include a range of steps intended to address the problems presented in subsection 2.4. Implementation of these measures should help diminish both the impact of the shock, and the resultant damage to the student's future studies at the Technion.

### **3.4.2 Preparatory Workshop**

Shortly before they commence their studies at the Technion, new students would be invited to a preparatory workshop lasting several days. During this workshop, the students would receive guidance aimed at assisting them during this crucial period. The workshop program would include, inter alia: getting to know the Technion, meetings with representatives of the faculty where the students will be majoring, explanations of the administrative apparatus, recommended study methods, the structure of the Student Union, functions of the Unit for Student Advancement, familiarization with the campus and libraries, etc.

### **3.4.3 Strengthening Ties between the Students and their "Major" Faculty**

*Steps will be taken to strengthen the students' connections with the faculty where they will be majoring. These activities will be carried out on a basis of full cooperation between the "major" faculty and those faculties responsible for teaching the basic courses.*

The following is a description of the various activities:

- \* An effort should be made to see to it that the basic subjects are taught in groups, divided according to majors.
- \* Areas of emphasis and examples in the various groups would be tailored to the student's major. Minimal changes (of no more than 10%) in the present course



format could have a significant impact.

- \* At least once a semester, a teacher or assistant from the major faculty would be brought into the basic courses. This teacher would present ways of using the material studied, to solve problems related to the student's major.
- \* Each faculty would appoint a liaison to the teachers responsible for basic subjects (this can be the teaching coordinator mentioned in subsection 3.2.3.4). This liaison would assist the teachers of basic subjects in selecting relevant examples. He would also coordinate the participation of faculty members from the student's major in the basic courses.
- \* An effort should be made to teach at least one course in the student's major as early as the first year of study (if possible, during the first semester). Certain faculties offer courses (i.e., "Introduction to ...") specifically designed for this purpose.

### **3.3.4 Close Attention to the Smooth Progress of Studies During the First Year**

New students, who often fall prey to first-year shock, are largely preoccupied with trying to adapt themselves to the system. It is rather unlikely that such students would attempt to safeguard their "rights" by complaining about "problems" in the curriculum. *In light of this, the Committee recommends that the workload of the recommended curriculum for first-year students be rigorously examined.*

Such an examination should entail:

- \* Close examination of the workload assigned as homework. There is often a tendency to load the student with work that requires much more time than is permissible under Technion regulations.
- \* It is often the case that material used in certain courses has not yet been taught as part of the basic subjects. While this phenomenon is sometimes encountered with long-time students as well, it is particularly serious during the early semesters and should be avoided.

### **3.4.5 Professional Literature in Hebrew**

In recent years, the Technion has adopted the approach that students should become accustomed to using professional literature written in English. This concept is sound, in that it helps prepare the engineer and the scientist for the nature of their post-university work (since the vast majority of reference material is in English). Nevertheless, the Committee feels that this step can be postponed until the later years of study. *Hebrew-language textbooks in the basic courses should be published in order to assist the beginning student.*

### **3.4.6 Directing Talented Teachers to the Basic Courses**

Talented teachers frequently avoid teaching the basic courses due to the heavy workload imposed on teachers of these courses (huge classes, long counselling hours, numerous tests, etc.). *The Committee recommends encouraging the assignment of talented teachers to the basic courses, with appropriate reward.*

## **3.5 Development of the Means Necessary for the Advancement of Teaching at the Technion**

### **3.5.1 General Overview**

Assorted measures are necessary in order to enhance the quality and status of instruction at the Technion. The natural choice for the formulation of these methods would seem to be the Center for the Advancement of Teaching; however, despite its achievements, the Center is currently incapable of providing the means necessary for a significant change in conditions at the Technion. The functions of the Center, as seen by the Committee, are listed below, along with other professional services necessary for the advancement of teaching at the Technion.

### 3.5.2 Expansion and Consolidation of the Center for the Advancement of Teaching

*The Center for the Advancement of Teaching must serve as the main instrument in the enhancement of instruction at the Technion. In order to fulfill this role, the Center's activities must be expanded and consolidated.*

The Center will be under the authority of the Dean of Teaching. It will be headed by an individual who views this role as his primary function at the Technion for an extended period (in addition to running the Center, he can of course teach subjects in his field of specialization). The Center staff will be expanded so as to carry out the following tasks:

- \* Offering expert services in various aspects of teaching. These services would include guidance and assistance to faculty members and teaching assistants in the following areas: improvement of teacher performance in the classroom, use of teaching aids, tools to assess student performance (exams, homework, etc.), and so forth.
- \* Organizing in-service training courses in teaching. The Technion would encourage new staff members and teaching assistants to attend these courses when they first commence working at the Technion. Such courses would include pre-semester guidance, and professional follow-up during the semester. Effort should be made to ensure that the courses are of a high quality.
- \* Following-up developments in the world of university teaching. The material would undergo classification and cataloguing, with copies of relevant material to be sent to the appropriate faculties.
- \* Organizing seminars and mini-courses on various aspects of teaching.
- \* Publishing a special bulletin on various aspects of teaching, which would report on events on campus and worldwide. This bulletin would be distributed to faculty members.
- \* Operating the audio-visual libraries on campus, as well as other technical services related to teaching.
- \* Creating a resource center in the area of teacher assessment (see subsection 3.2.2.3).

- \* Looking into new techniques for improving instruction, such as T.Q.M. in teaching.

### **3.5.3 Involvement of the Department of Education in Science and Technology**

The Department of Education in Science and Technology is made up of faculty members who specialize in various aspects of teaching. However, it is questionable whether their knowledge has been put to proper use in the advancement of teaching at the Technion. *The Committee recommends that approaches be considered that could involve the Department of Education in Science and Technology more effectively in the enhancement of instruction at the Technion and in the activities of the Center for the Advancement of Teaching.*

### **3.5.4 Proper Planning of Teaching Facilities**

Planning of classrooms, lecture halls, and labs is an important area of specialization. A great deal of innovative and rapidly-changing material is available on this topic. The fact that relatively new learning facilities at the Technion have proven to be problematic for their intended use indicates that the existing knowledge in this area at the Technion is insufficient. Since the Technion trains professionals in areas related to this field, it is only natural that it should serve as an expertise center.

*The Committee recommends the creation of an expertise center for the planning of teaching facilities (lecture halls, classrooms and labs).*

This center will guide and oversee the establishment of teaching facilities on campus. It will also be encouraged to sell its services to other bodies within Israel.

## 4. SUMMARY

The Committee for the Advancement of Teaching at the Technion was created in response to student pressure. Nevertheless, even without this factor, the conclusion would likely have been the same: the time has come for the Technion to take steps geared towards improving instruction. The intensive activity in this area at leading research universities (in North America and Europe) in recent years would indicate a clear need for such actions.

In this context, it should be noted that, in addition to the problems of research universities worldwide, there are certain local factors at play that relate to the Technion specifically. We have recently witnessed the rapid emergence of engineering schools in Tel Aviv and Beer-Sheba. We are also in the midst of a trend that includes the inauguration of B.Tech. tracks at various colleges. Taken together, these indicate that the Technion should expect a difficult struggle to "woo" good candidates. The level of instruction at the Technion will undoubtedly play a major role in the outcome of this struggle. In too many instances, Technion students are poor ambassadors, as a result of the negative message that they convey with regard to the quality of instruction at the institution. *If we wish to preserve the Technion's prominence, efforts must be made to enhance the quality and status of teaching at our institution.* Naturally, this must be accomplished without detracting from other important activities, including research and community service. On the contrary, it is only by successfully integrating all of these elements that they can thrive together as a whole, and lead to the creation of an outstanding research university.

The members of the Committee believe that we have an opportunity, as well as an obligation, at the present time to take appropriate steps to enhance instruction at the Technion. Any delay will only make similar activities more difficult in the future. The recommendations noted in section 3 together outline a path towards this objective; however, the three most important recommendations are:

- \* *To make a fundamental decision to change the status of teaching at the Technion.*
- \* *To appoint a suitable faculty member as Dean of Teaching.*
- \* *To take the first steps towards changing the status of instruction at the Technion.*

Execution of these three recommendations will represent an important step in the true enhancement of instruction at the Technion.

As noted above, the issue of advancement of teaching has been on the agenda of numerous research universities the world over for some time now. Nevertheless, it appears that, for various reasons, there has been a delay in addressing this area in Israel; as a result, the Technion has the opportunity to be a pioneering force in Israel on this issue. As such, it can attract the interest of government bodies, which could offer support of various types. Additionally, the steps taken by the Technion can serve as a model for other institutions in Israel.

## About the Samuel Neaman Institute

The Samuel Neaman Institute for Advanced Studies in Science and Technology is an independent policy-research institute, established in 1978 to assist in the search for solutions to national problems in science and technology, education, and economic, health and social development. An interdisciplinary think-tank, the Institute draws on faculty and staff of Technion, other institutions and scientists in Israel and specialists abroad. The Institute serves as a bridge between academia and decision makers through research, workshops and publication.

The Institute pursues a policy of inquiry and analysis designed to identify significant public policy problems, to determine possible courses of action to deal with the problems, and to evaluate the consequences of identified courses of action.

As an independent, not-for-profit research organization, the Institute does not advocate any specific policy or embrace any particular political philosophy. As befits a democratic society, the choices among policy alternatives are the prerogative and responsibility of the elected representatives of the citizenry. The Samuel Neaman Institute endeavors to contribute to a climate of informed choice.

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Technion - Israel Institute of Technology  
**The S. Neaman Institute**  
for Advanced Studies in  
Science and Technology  
Technion City  
Haifa 32000, Israel

Telephone: 972-4-237145  
Fax: 972-4-231889