

# Quality Assurance of Educational Programmes at the Swiss Federal Institute of Technology Zurich (ETH Zürich)

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**Keywords:** *Quality Assurance, Degree Course Scheme, Interrogation of Students, Management Information System*

**Abstract:** *The paper shows the contribution of the students in the evaluation of degree course schemes, especially the interrogation of the alumnis. Together with the departmental characteristic profiles, calculated by the management information system (MIS), the school management get a good knowledge of the departmental level. The results are a guidance for planning and for allocating main areas of educational programmes. Interesting time series and comparison between different departments are shown.*

## Preface

To control teaching quality, the Swiss Federal Institute of Technology in Zurich (ETH Zürich) has developed a three part system: Firstly questioning the students every third semester about the lectures they attend and their lecturers; secondly questioning the graduates about their career embarkation and the type of employment sought (this is done by means of a questionnaire which is sent with the diploma) and finally evaluation of a department by an international expert commission every six to nine years. The latter point - the evaluation of a department - can be broken down into three further elements: the actual evaluation of the department by external experts; the self evaluation of the department looking at its aims, strengths and weaknesses in preparation of the external evaluation and finally the questioning of graduates of that particular department two to six years after completion of their studies about their career and studies through the retrospective eyes of a young professional.

The following contribution will be taking a closer look at the various forms of participation of present and former students in the teaching evaluation programme and in particular will be looking more closely at the questioning of graduates. The questionnaires completed by the graduates and the answers received during questioning of students are evaluated by the ETH Information Management Group. Together with the departmental characteristic profiles, calculated by the Information Management System (IMS), the results give the school management and the departments a good assessment of the educational level and, at the same time, deliver important information about where adjustments in teaching methods should be made. Interesting time series and comparisons between the different departments will be shown.

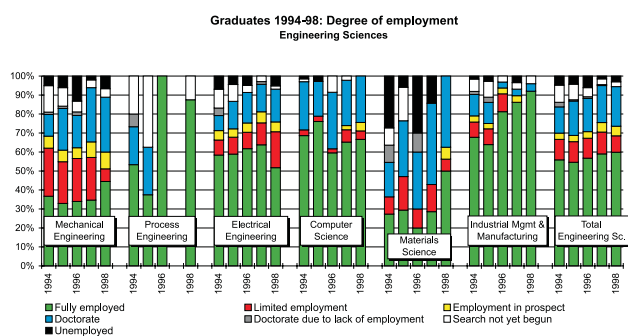
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### Course evaluation

In the course of the teaching evaluation, the students are asked about the lectures they attend and their lecturers. The questioning takes place in one and a half year intervals for all lectures of a particular curriculum. The questionnaire can be divided into four parts. The first part consists of three questions from the rector about the quality of the lecturers, how the teaching material is conveyed during lectures and about the quality of the written course documentation. The second part contains questions of the respective departments. Part three contains questions from the respective lecturer and part four open space for individual remarks of the students. The questionnaire is answered on an anonymous basis. The lecturers receive the results to parts three and four. The results to parts one and two are openly available in the intranet of the department and are discussed by the teaching committee.

### Employment statistics reports

Two to three months after completion of their studies, the graduates are asked about their professional plans and roads which are open to them. Questions are asked about the estimation of the employment market situation, the success or lack thereof in seeking employment, the correspondence between own conceptions about the form of employment and the job found and finally also about the importance of personal further education after study completion. The employment statistics reports are published on a yearly basis. They consist of a brief summary of the most important results and a lengthy graphical part. The evaluation of present graduate results can also be compared with past graduate results back to 1994.



Picture 1: Degree of employment, Engineering Sciences

The evaluation of the answers give the school management, the departments and the students valuable indications about the situation in the employment market and also about the graduates' future chances immediately after completion of their studies. A comparison over a period of several years allows deep and - on a middle term basis - significant analyses.

### Peer Review

The evaluation of the departments in research and teaching consists of three elements: Firstly the department's report as a form of self evaluation in order to prepare the evaluation week. Each institute of the department writes a report about its strengths, weaknesses and aims in the fields of research and teaching. Secondly a report about the results of the questioning of the graduates of the respective department. This takes place two to six years after the completion of their studies and deals with career and study issues in retrospect from the viewpoint of a young professional. Thirdly the evaluation of the department by external experts, the peers, who hold interviews for a week which they base on the previously mentioned reports.

### Interrogation of the alumni

The report with the results of the questioning of the graduates is written by the Information Management group. The aim of this survey is to be able to pass measures to improve and supplement education. The questionnaire contains two main subjects: occupation and study in retrospect. The questions concerning occupation, two to six years after having begun work or after having completed a diploma at the ETH, are associated with the questions on the questionnaire about employment statistics. They partly serve as a supplement to the inquiry about the situation in the employment market immediately after having graduated. The questions concerning the retrospective assessment of the studies are partly based on an inquiry by the Massachusetts Institute of Technology (MIT). The questionnaire contains two types of questions: Quantitative information is ascertainable by means of structured and mechanically readable answers. Qualitative aspects, on the other hand, are ascertained by means of questions which subsequently have to be individually evaluated.

Questions about the employment situation:

- Success searching for a job and degree of employment,
- Employer and branch of employment,
- Occupation and position within the company,
- Professional relationship between the present occupation and studies,
- Salary.

Retrospective questions about the studies:

- Actuality of the curriculum contents,
- Imparting of specialized knowledge during basic courses and specialized studies,

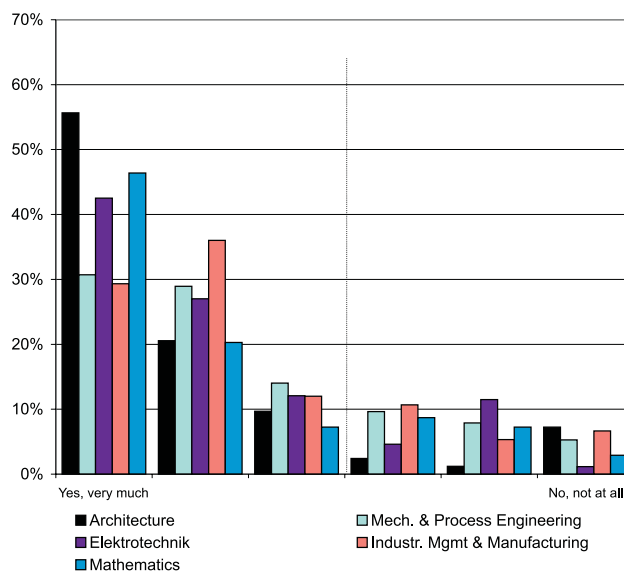
- Provision of methodical knowledge (in general, in time management, project management,
- acquisition of information),
- Provision of general competencies (in law, business economics, marketing, presentation skills),
- Importance of the chosen fields, expectations towards the ETH and effective contribution of the ETH to personal development in these fields,
- Number of compulsory hours per week,
- Relative distribution of the form of the compulsory lectures,
- Length and form of practical field work,
- Guest terms at other universities or technical institutes
- Assessment of the educational process.

Open questions about lectures and academic teaching:

- Naming of one to two lectures which are of particular importance in connection with the present occupation,
- Naming of one to two lectures which are completely irrelevant to the present occupation,
- Naming of lectures which today are regarded as being of importance but, whilst studying,
- were not presented in an attractive form
- Naming of lectures and specialized subjects which from today's point of view were not available at the time
- Naming of academic teachers which particularly stay in mind

The answers to the questions about the occupational situation illustrate how far the graduates' present occupation correlate to their education. Together with the questions about employers and branches and also about begun or completed further education, a good insight is provided into the employment situation. Deductions about proximity of the studies to the market situation can be made.

Does your present job pertain to your studies ?



Picture 2: Does your present job pertain to your studies?

Interesting information about the graduates' salaries emerge from the questions about their professional situations depending on the branch and number of years in professional life. A comparison between different studies can be made.

The questions pertaining to the professional situation therefore inform about the employment situation of the graduates two to six years after having completed their studies and offer a comparison be-

tween the market value of the graduates of the various departments.

Questions pertaining to the study with a present view seek to determine deficiencies therein and also establish where improvements have to be made. The answers to the questions about how methodic knowledge is conveyed inform about the sufficiency of the knowledge received during the study course in the own specific fields and in the fields of project management, time management, information procurement and so forth. Analog evaluation also take place about the imparting of general competencies in the fields of law, business economics, marketing and presentation techniques.

The 27 questions derived from MIT deal with wide-spread fields from "knowledge of a particular field / discipline", "understanding scientific theories and methods", to "creativity" and "knowledge of social / political issues". The answers are given on a five-level scale according to:

- the importance of the field,
- the contribution which was expected from the ETH in this field and
- the effective contribution which was made by the ETH.

These 27 questions were translated from an MIT questionnaire and used one to one by the ETH. Generally speaking the graphical evaluation showing the average values of all answers indicates that the importance of a field is most highly rated, the effective contribution the lowest and the expected contribution in between.

The results allow questions such as the following to be answered:

- Are particularly important subjects, whereby a large contribution is expected from the ETH, taken enough into consideration ?
- Are there fields in which a large contribution is expected and the effective contribution is small? If this is the case, is there need for action to be taken or are the expectations simply too high?
- On the other hand are there fields of high importance in which expectations from the ETH are low? If this is the case, are these fields outside the range of studies at the ETH? Can these fields be integrated into studies at the ETH?

The MIT questions are so widely formulated that cross references can be made to further quantitative and qualitative questions.

It can be determined from the answers about the assessment of the lectures if, in the eyes of the graduates, there is a lack or an excessive amount of educational events in the form of lectures, exercises, practical field work, case studies, diploma work and so forth.

To round off the quantitative questions, the educational process as a whole is assessed. The majority of alumni affirm that, if they could start afresh, they would not only choose to study again but they would also once more study the same subject at the ETH.

assessed as being very important by mechanical engineers, on the one hand, and, on the other, as being highly unimportant by electrical engineers. In the meantime, during a revision of the curriculum, this fact has been taken into account. The number of lessons in mechanics was reduced for electrical engineering students. It is also immensely critical to ask about important lectures which have not been presented in an attractive way in the past. The content or methodical factors can be responsible for this or indeed communication problems on the part of the lecturer. The school management and the departmental management are in possession of this information and can take the necessary steps.

The graduates also give an interesting insight into lectures or fields which, in their view, are presently not available. Generally speaking the majority of fields are relatively well covered. Here either specific in-depth courses or lectures, which because of the freedom of choice in the curriculum were not attended, are mentioned. Action has to be taken if a particular course is frequently named. A solution can be reached by making additions to the courses, by the introduction of supplementary courses or also by changing the composition of the compulsory subjects within the curriculum.

The quantitative answers in the area of general competencies can also be controlled. Mostly it is felt that business sciences and marketing are missing from the technical studies. Depending on the course of studies, there is a higher need for courses covering society, ethics, politics and economics. This and other factors have led to the department of the Humanities, Social and Political Sciences being given a stronger position within the ETH. Its courses are also now better integrated into the curriculum as a whole. Admission to final examinations is only possible when lectures have actively been attended on a regular basis.

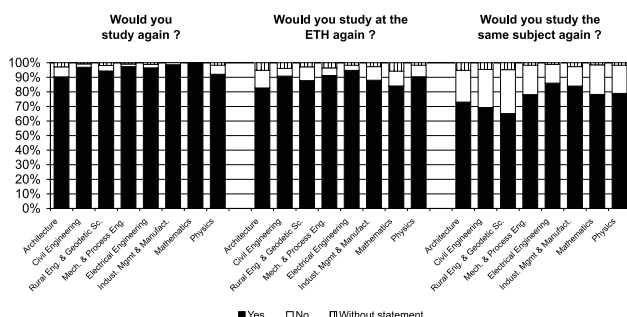
The naming of individual lecturers is evaluated on a highly confidential basis. In the majority of cases, references are positive. The rector of the ETH Zürich possesses this list of names and can, fitting to his managerial position, intervene in a motivating or correctional manner.

## Conclusion

The report about the quantitative questions concerning employment and studies in retrospect and the qualitative statements about the lectures form an important basis of information for the external expert team in order to be able to judge the department during its evaluation. Research activities are documented in the institutes' reports and subsequently validated during the expert commissions' interviews with representatives of the institutes.

The resulting report of the expert commission represents an independent assessment of the department regarding its teaching and research activities in an international comparison. For this reason, the report is rated with high importance by all instances (school management, department and institutes).

To make the positioning of the department within the ETH as a whole clearer, the Information Management group puts together characteristic profiles of the various departments. The profile is a list of characteristic values - number of new entries, total number of students, diplomas, doctorates, employees, courses, professors, lectures, financial means, third party means and available working space per department. The sum of all the departments delivers the grand total for the whole of the ETH from which average values can be calculated. The relative positioning of these average values shows interesting aspects. Knowledge about transfer of teaching performances from one unit to another have to be taken into account. This, for instance, applies to the Department of Mathematics which has relatively few students and an over-average amount of teaching activity. These activities are documented in a transfer matrix.



Picture 3: Study again ?

The answers to the qualitative questions are assessed in a confidential part. Interesting statements can be made about the importance or unimportance of certain lectures. For instance, mechanics is

To conclude, the school management and the management of the departments have extensive information in their hands in the form of teaching evaluations, employment statistics, the results of questioning the alumni and the profiles of the various departments which enable them to judge the teaching level on a qualitative and quantitative basis.