

THE ASSOCIATION OF EUROPEAN CIVIL ENGINEERING FACULTIES
with the participation of Civil Engineering faculties from non European countries

AECEF

TEMPUS Complementary Measures Grant 1993/4
REPORT
PROJECT ON CURRICULA AND STUDY PLAN ANALYSIS

CONTRACT

N°CME-93-B-2003

for the period 1 January 1994 - 31 August 1994

between

EC TEMPUS Office

and

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TEMPUS Complementary Measures Grant 1993/4

REPORT

PROJECT ON CURRICULA AND STUDY PLAN ANALYSIS

The project carried out during the period from 1st January to 30th September 1994 was supported within the framework of the program of the TEMPUS Complementary Measures Grant 93/94.

CONTRACT No.: CME-93-B-2003.

CONTRACTOR: Professor Jiří Witzany, President of AECEF.

Grant amount: ECU 10000.

A OBJECTIVE OF INVESTIGATION

The objective of investigation was an analysis of curricula and study plans particularly of European but also of non-European (USA, Canada) schools of university status giving instruction in Civil Engineering and Surveying. The investigation was focussed on obtaining data describing the type of school and its position within the framework of the University, the curriculum structure, the length of study, the students' practice on the building site, the type of study and its specialization, the number of students and teachers, the manner of finishing the study and the kinds of degree (titles) awarded.

B METHODS OF INVESTIGATION

Within the framework of the preparation it was decided to carry out the investigation in form of a Questionnaire. The individual respondents were asked to enclose their curricula with the Questionnaire. It was emphasized that the data would be used only for statistical processing and would not be published separately. Owing to a considerable extent of the Questionnaire and the great number of respondents it was decided to process the data obtained by computer.

The Questionnaire aimed at obtaining the data was the result of an adaptation of two original versions prepared by Professor Zech and Associate Professor Vávra.

The Questionnaire enclosed in the form of an Appendix with this report was sent during March and April to 36 schools of university status giving instruction in Civil Engineering (CE) that are members of AECEF and to further 85 schools teaching Civil Engineering that have up to now not been members of AECEF. A list of schools that were sent the Questionnaire is again included in the Appendix of this report.

During the carrying out of the investigation two meetings of the members of the Board and the Secretariat of AECEF took place. It was in June 1994 in Prague, where the partial output of the first part of the investigation was discussed, and in September 1994 in Porto where attention was focussed on the final investigation report. During the journey to Porto the Contractor-President of AECEF, with the General Secretary and Secretary of the Secretariat AECEF visited several schools that showed on interest in the investigation results.

The data obtained were transferred into the table processor Works for Windows where their basic analysis was carried out. For the purpose of a statistical data analysis software produced by the firm Statsoft - Statistics was purchased by means of which a correlation analysis of selected data was performed.

C AIMS OF INVESTIGATION

The aim of the investigation was to obtain a survey of the contemporary contents and objectives of teaching and to contribute towards the formulation of the requirements concerning the extent and profoundness of knowledge a graduate of the European schools of university status must acquire during his studies to be acceptable as an expert in all Europe. In this connection not only the study specializations and the scope of the individual subjects had to be analyzed but also the duration of study necessary for attaining the individual degrees had to be considered. In the future this would make possible a certain form of free movement of students among the individual schools within the framework of European studies.

A further aim of the investigation was to find out if there is a correlation between the individual selected factors, such as the number of students, the number of teachers, the scope of teaching, etc., that could in the future contribute towards a rationalization of the teaching process.

D USE OF INVESTIGATION RESULTS

The investigation results will be used in the preparation of the First International AECEF Symposium. At this symposium the conclusions of the investigation would be discussed and recommendations for an adaptation of the curricula and teaching systems of schools of university status teaching surveying and civil engineering would be formulated.

We further intend to present the investigation results at conference on a similar theme held by the American Society of Civil Engineers (ASCE) in Denver (Colorado) from 8th to 11th June 1995.

The database concerning the individual schools elaborated during this project will in the future be accessible to all members of AECEF and will become a contribution to deeper mutual information which will no doubt make possible a more intensive exchange of ideas, students and teachers.

E ANALYSIS AND EVALUATION OF INVESTIGATION RESULTS

Fundamental characteristics of schools of university status included in the investigation.

Within the framework of the investigation by means of the Questionnaire 29 schools of university status filled in and returned the Questionnaire. The percentage concerning the type of school was the following:

Universities	48 per cent
Technical Universities	45 per cent
Technical Schools	3 per cent
Other types of Schools	4 per cent

The teaching of Surveying and Civil Engineering is carried out in 52 per cent of cases at independent Faculties of Civil Engineering, in 41 per cent of cases at Departments forming part of Engineering Faculties, in 3 per cent of cases at Schools of Civil Engineering, and in 4 per cent of cases these are different arrangements.

At the head of these schools there are Deans in 52 per cent of cases, Heads of Departments in 41 per cent of cases, and Chairpersons in 7 per cent of cases.

46 per cent of schools admit students to study without entrance examinations, 38 per cent of schools limit the number of applicants by requiring a certain study level achieved at the secondary school, 31 per cent of schools carry out entrance interviews on the basis of which a list is made up, the number of students to be accepted being fixed. 12 per cent of schools require that the student should have practice in the building industry.

The size of the individual schools can best be characterized by the number of students and teachers. While the average number of students studying Civil Engineering at one school is 1311, the maximum number is 12 195 students studying at the University of Essen, and the minimum is 85 students attending the University of Kansas.

Structure of curricula, forms of teaching

To be able to estimate the basic structure of the curricula individual schools we divided the teaching subjects into the following groups:

- Humanities
- Basic Subjects
- General Engineering Subjects
- Specialized Subjects of Civil Engineering
- Final Work (Diploma, Work, Thesis).

We were further interested in which years of study these groups of subjects are taught. All these data can be found in concentrated form in Table 1 as average values from all schools, together with the maximum and the minimum numbers found for the given subject group.

As all the schools have enclosed detailed curricula with the Questionnaire a detailed analysis of the representation of individual subjects can be carried out if need be at any time in the future.

Table 1

%	Undergraduate Study			Postgraduate Study			Doctoral Study		
	max.	ϕ	min.	max.	ϕ	min.	max.	ϕ	min.
Humanities	22	7.3	0	13.2	4.5	0	10	1.5	0
Basic Sciences	97	29.5	2.5	34.4	10.8	8	40	6.4	0
Engineering Sciences	54.1	25.4	0	49	17.1	0	30	6.2	0
Concentration on CE	69	33.3	0	90	52	20	80	35.2	0
Final work	30	4.5	0	67	15.6	0	100	50.7	0

The average values listed in Table 1 are to be seen in Fig. 2.

The beginning of the teaching of the individual subject groups is the following: Humanities start in the 1st year in 76 per cent of cases, in the second year in 19 per cent of cases, in the 3rd year in 5 per cent of cases. Basic Sciences begin in the 1st year in 96 per cent of cases, in the 2nd year in 4 per cent of cases. Engineering Sciences start in the 1st year in 52 per cent of cases, in the 2nd year in 36 per cent of cases and in the 3rd year in 12 per cent of cases. Concentration on civil engineering subjects starts in the 1st year in 15 per cent of cases, in the 2nd year in 12 per cent of cases, in the 3rd year in 65 per cent of cases and in 4th year in 8 per cent of cases.

The following part of the investigation is focussed on the forms of teaching at the individual schools and on their proportion in the overall time of study. The results are shown in Table 2. The average values are to be seen in Fig. 3.

Table 2

%	Undergraduate Study			Postgraduate Study			Doctoral Study		
	max.	ϕ	min.	max.	ϕ	min.	max.	ϕ	min.
Lectures	86.5	58.1	40	83.2	56.8	37.5	100	48	0
Projects	30	12.7	0	40	16.9	0	100	37.9	0
Seminars	42	11.1	0	40	12.6	0	58	11.1	0
Visit and Work on Building Site	15	3.3	0	9.1	2.8	0	5	1.1	0
Laboratory Assignments	48	14.8	0	38	10.9	0	56	11.9	0

27 per cent of schools offer Evening Study and 31 per cent of school arrange Corresponding Courses.

Duration of Study

The basic time unit according to which the teaching is organized is the semester in 92 per cent of cases, a trimester in 4 per cent of cases, and one year in the case of the remaining schools. Table 3 gives information about more detailed average data concerning the number of teaching lessons or credits throughout the overall time of study, the recommended and the reached duration of study, the length of practise in building production or projection offices, and the length of excursions to building sites.

Table 3

		Undergraduate Study			Postgraduate Study			Doctoral Study		
		max.	ϕ	min.	max.	ϕ	min.	max.	ϕ	min.
Classroom hours per	week study	50 3400	25.2 1431.6	16 32	35 4300	21.9 1558.6	8 18	14 1600	9 503.7	6 18
Years per study	recom. reached	5 7	3.7 4.5	1.5 2	5 7	3.3 4.2	1 1	4 5	2.9 3.8	2 3
Training in construction	weeks	80	21.6	0	20	8.9	0			
Number of visits on building sites		25	5.8	0	15	6.1	0	15	9	3
Hours per study	oblig. optional	3461 700	2130.4 249.6	144 11	5500 500	3751 266	465 55	840 400	735 400	630
Credits	total	5760	668	3	3579	379.8	9	72	52.5	36

Study Specialization

The following part of the investigation was focussed on study specialization. The following section of the report shows in what percentage the individual specializations occurred as regards the schools that gave this kind of information. We further show the participation of the students (in percentage) in the individual study specializations in the years 1982 and 1987, and in the year 1992 only in the case of those schools where the respective specialization exists.

Table 4

Specialization	In 1992: Schools offering this specialization Representation share in the total number of students			
	Percentage	Year 1982	Year 1987	Year 1992
Building Construction	83.3	41.4	37.0	36.4
Environmental Engineering	66.7	15.7	20.9	26.4
Structures	58.3	26.7	27.1	26.5
Surveying	25	13	12.4	5.3
Transport Engineering	75	23.1	24.2	24.4
Others	58.3	34.6	34.8	29

Some of the schools do not offer specialized study and the students specialize by means of choosing the respective optional subjects after consulting their teachers.

Finishing of the Studies and Types of Degrees

In 69.6 per cent of schools the study is finished by a final examination. In 65.2 per cent of schools diploma projects are to be worked out and in 60.9 per cent of schools theses dealing with the imposed task are to be elaborated.

If a diploma work is to be worked out, the time for its preparation varies from 7 to 56 weeks, 17 weeks being the average. The diploma project usually begins in the 9th semester and in 72 per cent of schools it must follow after passing the prescribed examinations. The students have to complete the project at the end of study.

Table 5 illustrates the percentage of schools where the respective degrees are awarded, and the percentage of students from the overall number of students that were awarded the degree at the schools under investigation in the years 1982, 1987 and 1992. From Table 6 the proportion of undergraduate and postgraduate students and the representation of men and women at the individual schools is obvious.

Table 5

Type of degree (title)	Representation at individual schools	Overall number of awarded degrees from overall number of students for individual schools		
	Percentage	Year 1982	Year 1987	Year 1992
BSc	71.4	21.8	20.0	23.6
MSc	85.7	16.3	16	11.1
PhD	85.7	5.7	5.7	5.1
Dipl. Ing.	14.3	18.2	18.1	19.1

Table 6

Type of students (in percentage)	Year 1982	Year 1987	Year 1992
Undergraduates	44.9	43.2	58.3
Postgraduates	55.1	56.8	41.7
Male	79.2	75.6	77.6
Female	20.8	24.4	22.4

Numbers and Teaching Duties of Teachers

In the investigation of the numbers and duties of the teaching staff we were interested in the proportion as regards the individual pedagogical categories; further, if teachers work full time or part time, the numbers of the technical staff and the proportion of this group in the total number of employees. We further investigated the participation of the students in the teaching process and the extent of teaching duties in the respective categories of teachers. All these data were followed from the point of their development during the recent years.

Some of the results of the mentioned investigation are shown in Tables 7 and 8.

Table 7

Teachers - Percentage		Year 1982	Year 1987	Year 1992
Professors (Prof.)	full time	27.9	28.7	31.8
Associated Professors (Doc.)	full time	22.6	21.5	21.1
Assistant Prof.	full time	49.5	49.8	47.1

Table 8

Approximate scope of teaching duties hours per week	Year 1982	Year 1987	Year 1992
Professors	8.9	8.7	8.1
Associated Professors	7.9	7.8	8.2
Assistant Professors	9.4	9.9	9.8

Correlation Analysis of the Data Obtained

At the end of the statistical processing of the obtained data we carried out a correlation analysis of some of the sets to determine the mutual connection of the selected factors, particularly in connection with the number of teachers.

It is, however, necessary to take into consideration that the size of the schools filling in the Questionnaire varied considerably and that all schools did not answer all the points. An exceptional position is held by the University of Essen, where the number of students studying Civil Engineering and Surveying represented in the year 1992 53 per cent of all the students, i.e. 12 195 persons. The second place is held by the Faculty of Civil Engineering of the Czech Technical University of Prague with 4101 students. Only one more school has over 2000 students while the remaining schools have less than 2000 students.

If we express the relation between the number of teachers and the number of students of Civil Engineering by means of linear regression we obtain the relation.

The number of teachers = 5,3289 plus the number of students multiplied by 0.091

This means that if the number of students increases by 100 the number of teachers increases by 8 or 9.

If we consider the number of teachers corresponding to 100 students we find that at 19 schools this number is less than 12. Six schools employ 14-20 teachers per 100 students while at one school this number varies between 26 and 28.

If we take into consideration the average number of teachers per 100 students in the years 1982, 1987 and 1992, the corresponding values are 11.9, 10.6 and 9.5 which means that the number of teachers has considerably decreased. In these evaluations, however, we must consider that the data for the years 1982 - 1992 were supplied only by about 40 per cent of the schools contacted.

It is further interesting that the more teachers there are per 100 students, the greater is the extent of their teaching duties. The correlation coefficient between the number of teaching hours and the number of Assistant Professors per 100 students is 0.25, the correlation coefficient between the number of teaching hours of an Associate Professor and the number of teachers per 100 students is 0.24, and the correlation coefficient between the number of teaching hours of a Professor and the number of teachers per 100 students is 0.20.

We further investigated the scope of teaching duties of teachers according to the different countries in which the schools are situated. In the case of Professors the teaching duties fall into two groups. The first group is e.g. Canada, The United States, the Czech Republic and the Slovak Republic, where the number of teaching hours is six hours per week. The second group includes Germany, Poland, Romania and Denmark with about 10 hours of teaching duties per week. The teaching duties of Assistant Professors are the lowest for example in Germany, the United States and Canada, where they vary about 6 hours per week, while in Denmark, Poland and Romania they are about 12 hours per week. In the Slovak Republic the teaching duties of Assistant Professors are about 16 hours per week and in the Czech Republic 20 hours per week.

Summarizing Conclusions and Recommendations

The teaching of Civil Engineering and Surveying is carried out for the most part at Universities (48 per cent) and Technical Universities (45 per cent) which are directed mostly by independent Deans (52 per cent).

The interest in the study of Civil Engineering is most frequently promoted by admitting students to study without entrance examinations (46 per cent). Some schools, however, limit the number of applicants by requiring a certain level of study progress at the secondary school. Where there is a great interest in the study and the capacity of the school is not sufficient, the number of new students is limited by entrance examinations (31 per cent).

Except the basic full time study (day study) of Civil Engineering and Surveying the schools offer the possibilities of participation in corresponding courses and evening study (27 per cent).

The basic time unit into which the teaching is divided is the semester (92 per cent).

In the curricula of undergraduate study the subjects focussed on Civil Engineering (33.3 per cent) predominate over subjects including the basic sciences (29.5 per cent). In the case of postgraduate study there is an unambiguous predominance of subjects concentrating on Civil Engineering (52 per cent). As regards doctoral studies the main emphasis is laid on the final work (50,77) and on subjects concentrating on Civil Engineering (35.2).

The first year of study includes mostly subjects from the sphere of the Basic Sciences (96 per cent), Humanities (76 per cent) and partly of Engineering Sciences (52 per cent). Some schools include the subjects concentrating on Civil Engineering already in the first year of study (15 per cent).

The second year comprises subjects from the field of Engineering Sciences (36 per cent), Humanities (19 per cent) and subjects concentrating on Civil Engineering (12 per cent). In the third year the subjects concentrating on Civil Engineering (65 per cent) and on Engineering Sciences predominate.

The most frequent form of teaching in the case of undergraduate study, postgraduate study and doctoral study are lectures (58.1, 56.8, 58 per cent). The second place is held by projects (12.7, 16.9, 27.9 per cent). The extent of laboratory assignments is surprisingly about the same for all the forms of study (14.8, 10.9, 11.9 per cent).

The average weekly extent of teaching does not differ substantially as regards both undergraduate and postgraduate study (25.2 hours per week, 21.9 hours per week). In the case of doctoral study it is considerably lower (9.6 hours per week).

The average recommended duration of study concerning all the three forms of study mentioned (3.7 years, 3.3 years, 2.9 years) is as a rule exceeded by one year on the average.

The study specialization most frequently mentioned is Building Construction (83.8 per cent) and Environmental Engineering (66.7 per cent). While the number of students choosing the former specialization is rapidly decreasing the interest in the latter is steadily increasing.

The conclusion of the study has mostly the form of a final examination (69.6 per cent) and also diploma projects and theses are often elaborated and defended.

The schools offer most frequently the awarding of the MSc degree (85.7 per cent) and the PhD degree (85.7 per cent). As regards the schools under investigation the titles of BSc. and Dipl. Ing. have been most frequently awarded in the recent years and the percentage of their occurrence has remained stable. However, an interest in undergraduate study at the expense of postgraduate study is on the increase. The number of women students increases very slowly in comparison with the number of men students (22.4 per cent, 77.6 per cent).

As regards the proportion of Professors, Associate Professors and Assistant Professors during the recent 10 years, the number of Assistant Professors is decreasing and the number of Professors is increasing, while the number of Associate Professors is on the decrease.

The correlation analysis has shown that in the future a reduction in the number of teachers per 100 students should not lead to an increase in the extent of their weekly teaching duties in the realization of the teaching process. (In the case of higher concentration the teachers show a paradoxical effort to increase the number of their teaching hours.) The number of teaching hours as regards the individual categories of teachers should assume acceptable proportions.

G DATA CONCERNING THE WORKERS PARTICIPATING IN THE REALIZATION OF THE PROJECT

The Working Committee for the Comparability of Curricula and Systems of Studies of Civil Engineering was entrusted with carrying out the investigations. The Head of the Working Committee is the Vice-President of AECEF Professor Y. Zech from the Catholic University of Louvain. Associate Professor Ivo Vávra, Secretary of AECEF, from the Faculty of Civil Engineering of the Technical University of Prague, was entrusted with the dealing with the organizational and administrative work connected with the grant.

The basic Questionnaire which arose by an adaptation of the two original versions elaborated by Professor Zech and Associate Professor Vávra was graphically represented in the text editor Word for Windows by Mrs. Dagmar Hanušová, member of the Computing and Information Centre of the Czech Technical University of Prague at the Faculty of Civil Engineering.

The preparation of the data for statistical processing and their storing in the database under the respective Windows was carried out by Ing. Jan Malý, member of the Department of Building Technology of the Faculty of Civil Engineering of the Czech Technical University of Prague, who also performed, in co-operation with Associate Professor Ivo Vávra, the fundamental statistical processing of the data obtained. The carrying out of the correlation analysis concerning the selected data groups was entrusted to Associate Professor Daniela Jarušková from the Department of Mathematics of the Faculty of Civil Engineering of the Czech Technical University of Prague. Professor Jiří Witzany, President of AECEF, and the members of the Board participated in the elaboration of the final report. This report was translated into English by PhD Zdena Jeníková, external member of the Department of Languages of the Faculty of Civil Engineering of the Czech Technical University of Prague. The final accounting of the project was carried out by Associate Professor Ivo Vávra, Secretary of AECEF.

The text of the Report was copied by Mrs. Dagmar Hanušová.

H APPENDIX

1. List of schools participating in the project by filling in the Questionnaire of AECEF.
2. Questionnaire of AECEF.

- Fig. 1. List of the schools offering Civil Engineering and Surveying Courses of study that have filled in and returned the Questionnaire arranged according to the overall number of students.
- Fig. 2. Representation of the individual subject groups in undergraduate, postgraduate and doctoral study of Civil Engineering and Surveying.
- Fig. 3. Representation of different types of teaching of Civil Engineering and Surveying in undergraduate, postgraduate and doctoral study.
- Fig. 4. Correlation Analysis between the number of teachers and the number of students.

Appendix 1.

List of schools participating in the project by filling in the Questionnaire of AECEF.

No	Name of school	Town	State	No of students
1	Universitat - Gesamthochschule Essen	Essen	Germany	12 195
2	Czech Technical University	Prague	Czech Rep.	4 101
3	Technical University of Darmstadt	Darmstadt	Germany	2 372
4	Technical University of Berlin	Berlin	Germany	1 381
5	Technical University Munich	Munich	Germany	1 351
6	Technical University of Wroclaw	Wroclaw	Poland	1 351
7	Universitatea Tehnica Di Cluj-Napoca	Cluj Napoca	Romania	1 284
8	Rhur Universitat Bochum	Bochum	Germany	1 147
9	Gh. Asachi Technical Universitat Iasi	Iasi	Romania	1 143
10	Technische Universitat Carolo-Wilhemina	Braunschweig	Germany	1 015
11	State University Lvov Polytechnic	Lvov	Ukraine	900
12	Iowa State University	Ames	USA	792
13	Universidade de Porto	Porto	Portugal	690
14	University of Florida	Gaines Ville	USA	568
15	Technical University of Szczecin	Szczecin	Poland	558
16	University of Transport and Communication	Jilina	Slovak Rep.	492
17	Technical University of Cottbus	Cottbus	Germany	431
18	University of Sherbrooke	Sherbrooke	Canada	395
19	University of New Brunswick	Fredericton	Canada	380
20	University of New Hampshire	Durham	USA	316
21	Engineering College of Odense	Odense	Denemark	270
22	University of Southampton	Southampton	UK	246
23	Vrije Universiteit Brusel	Brusel	Belgium	235
24	Marquette University	Milwaukee	USA	230
25	University of British Columbia	Vancouver	Canada	160
26	University of Missouri - Kansas City	Kansas City	USA	85
27	Technical University of Budapest	Budapest	Hungary	--
28	Universidad de Granada	Granada	Spain	--
29	Institut. of Struc. Eng.	London	UK	--

AECEF - The Association of European Civil Engineering Faculties
Working commission I: Research of Curricula of Civil Engineering Faculties
Questionnaire about curricula of Civil Engineering study

Please return to the AECEF Secretariat Faculty of Civil Engineering, Thakurova 7, 166 29 Prague 6, Czech Republic

1.a IDENTIFICATION OF INSTITUTION	
Address of institution	Name
	Street & No.
	PO box
	City, State
	Postal code
	Country
	Internat. code/Phone No.
	Internat. code/Fax No.
	E-mail
Contact person	

Name of a person completing the questionnaire:

Please make a note giving further supplementary data, or all other data in case you cannot answer directly the questions given.
 All the data given will be used for statistic only and will not be published individually.
 At the end of the questionnaire, will you please list other suggestions connected with research of curricula and system of study.

1.b IDENTIFICATION OF INSTITUTION			
Name of institution		Yes X	Notes
Type of institution	Complete university		
	Technical university		
	Engineering school		
	'Grandes ecoles'		
	Technical school		
	Polytechnic		
	*		
Requirements for admission	Without exam		
	Entrance exam (fixed level required)		
	Competitive exam (fixed No. of admissions)		
	Requirements for practice		
Type of civil engineering organization	Faculty of Civil Eng.		
	Dep. inside a Faculty of Engineering		
	School of Civil Eng.		
	*		
Principal of organization	Dean of faculty		
	Head of department		
	Chairperson		
	*		

* Others

2. DEGREE AND SPECIALIZATION IN CE							
Type of degree		Under graduat.	Post graduat.		Other	Y/N	Notes
		BSc.	MSc.	PhD.			
What % of curriculum is devoted to the following areas?	Basic sciences-theoretical subj.						
	Humanities sciences						
	Engineering sciences (Statics, Hydraulics, etc.)						
	Concentration in CE (Steel design, Transp. eng., etc.)						
	Final work (Diploma, thesis, etc.)						
	Total	100	100	100	100		
	Concentration in CE professional subjects						
	Projects						
	Seminars						
	Visit + work on a build. site						
Total	Lab. assignments						
	Lectures						
	*						
		100	100	100	100		
	per week?						
	total per study?						
	total per study?						
	with degree?						
	without degree?						
	with degree?						
How many years per study recommended	without degree?						
	obligatory study hours? (credits)?						
	optional study hours? (credits)?						
	How many weeks req.?						
	Organized by the Univ.?						
	Financial support?						
	Who pays?						
	How many visits?						
	Organized by the Univ.?						
	Training periods in consultant offices or in construction firms						
Visit of building sites							

3.a ORGANIZATION OF CE TEACHING

	1st year	2nd year	3rd year	Other		Notes
In which year does your dep. accept students?						
When are these subj. included in lessons:						
Basic sciences - theoretical subjects						
Human. sciences						
Engineering sciences						
Concentration in CE (Professional subj.)						
From which year are students specialized?						

3.b ORGANIZATION OF CE TEACHING

		Yes	Notes
Do you offer grad. and non-graduate study programs?	In the evening	X	
	Distance study		
	*		
	Thesis		
Final work and for which degree?	Diploma project		
	Final exam		
	*		
	Semester		
What is your study program basis?	Trimester		
	Year		
	How long?		
	When does it start		
Diploma project	Must it follow the end of study?		

* Others

4. STAFF AND STUDENTS					
	Years	1982	1987	1992	Notes
Total No. of students	Undergraduate				
	Postgraduate				
	*				
Sex of students	Male				
	Female				
Type of degrees and No. of degrees	BSc.				
	MSc.				
	PhD.				
	Dipl.Ing.				
	*				
Specialization (branches) of study No. of students	Building construction				
	Environmental eng.				
	Structure				
	Surveying				
	Transport eng.				
	*				
	*				
	*				
	*				
Total No. of staff					
How many Professors? (Prof.)	Full time				
	Part time				
How many Assoc.Prof.? (Doc.)	Full time				
	Part time				
How many Prof. Assistants?	Full time				
	Part time				
Approx. teaching duties (hours per week)	Professors				
	Assoc.Prof.				
	Assistants				
How much technical staff?					
Students as teachers	How many?				
	Teaching duties (hours per week)				

* Others

If you have a publication with your curricula please enclose it. If you have not a publication please list courses required for graduation with each degree.

Note: list No. of lectures (L), seminars (S), lab. assignments (W), projects (P), exams (E), colleagues (C).

5. COURSES

[illegible]

Fig.1. List of the schools offering CE and Surveying courses of study arranged according to the overall number of students.

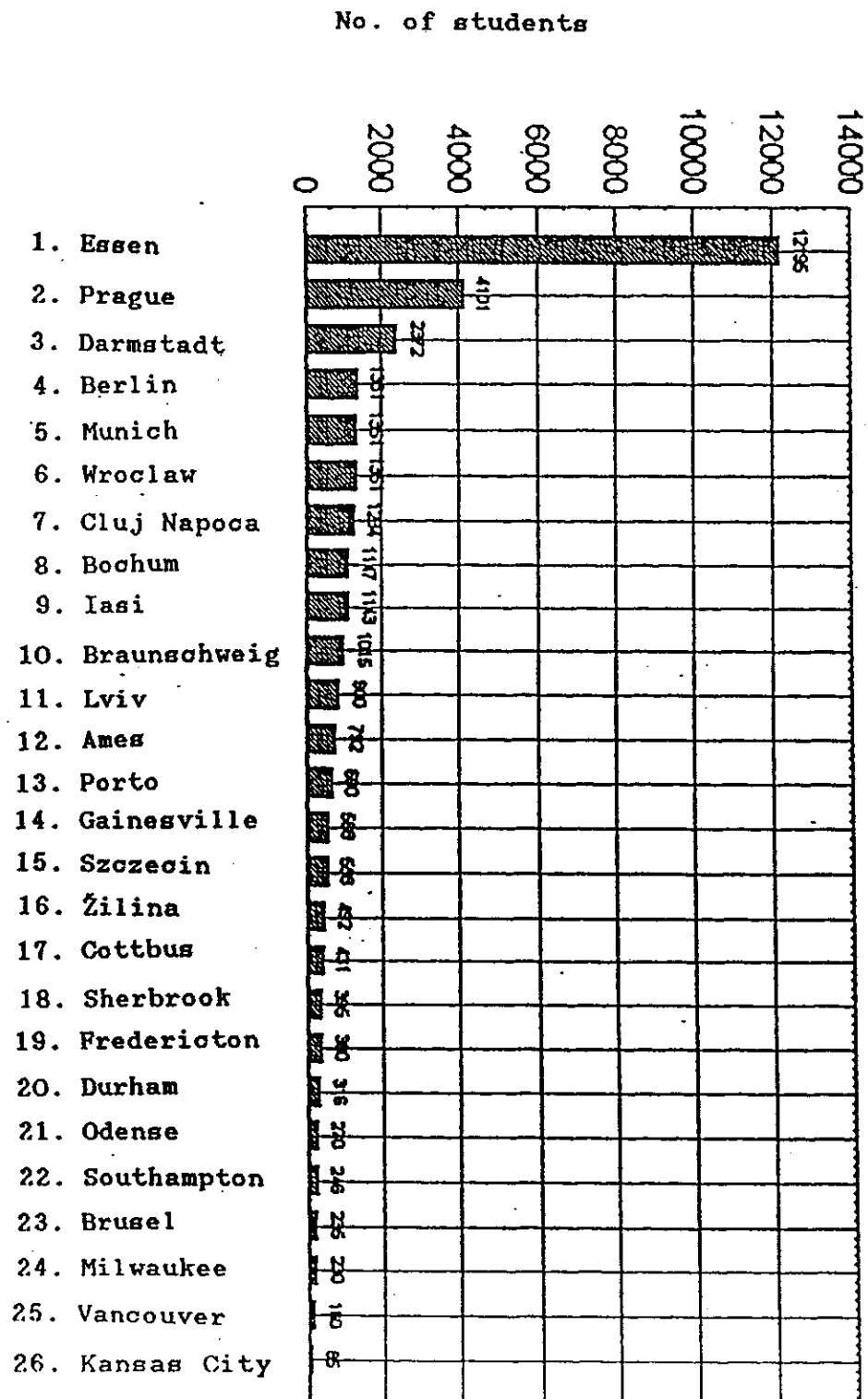


Fig.2. Representation of the individual subject groups in undergraduate, postgraduate and doctoral study of CE and Surveying.

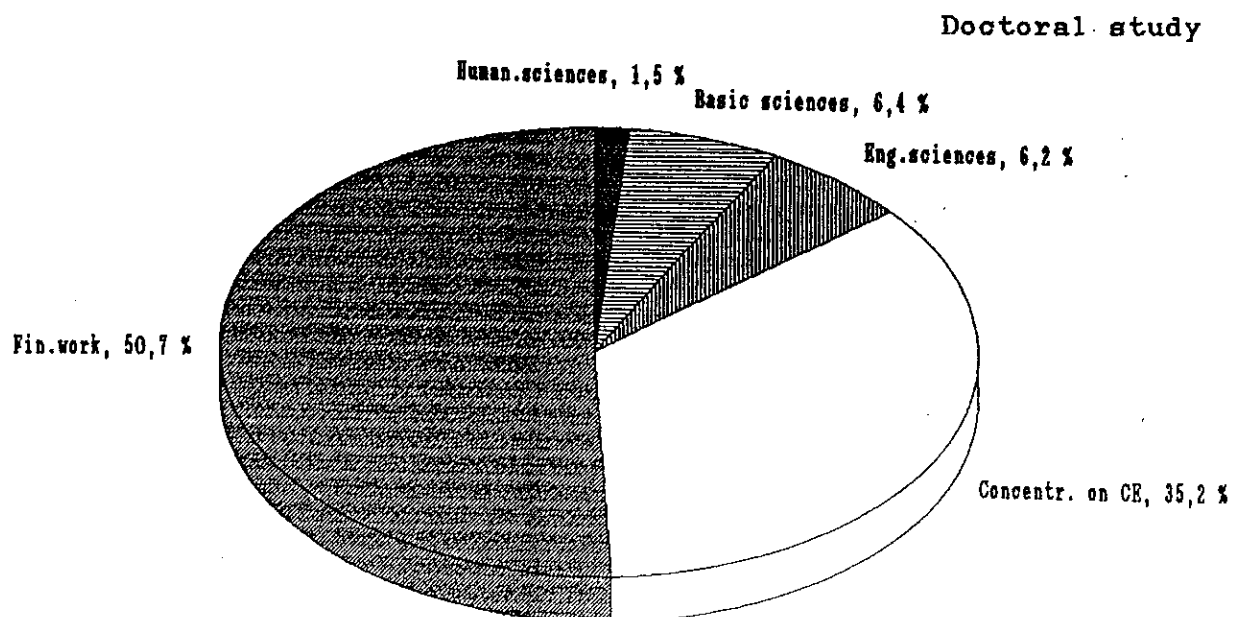
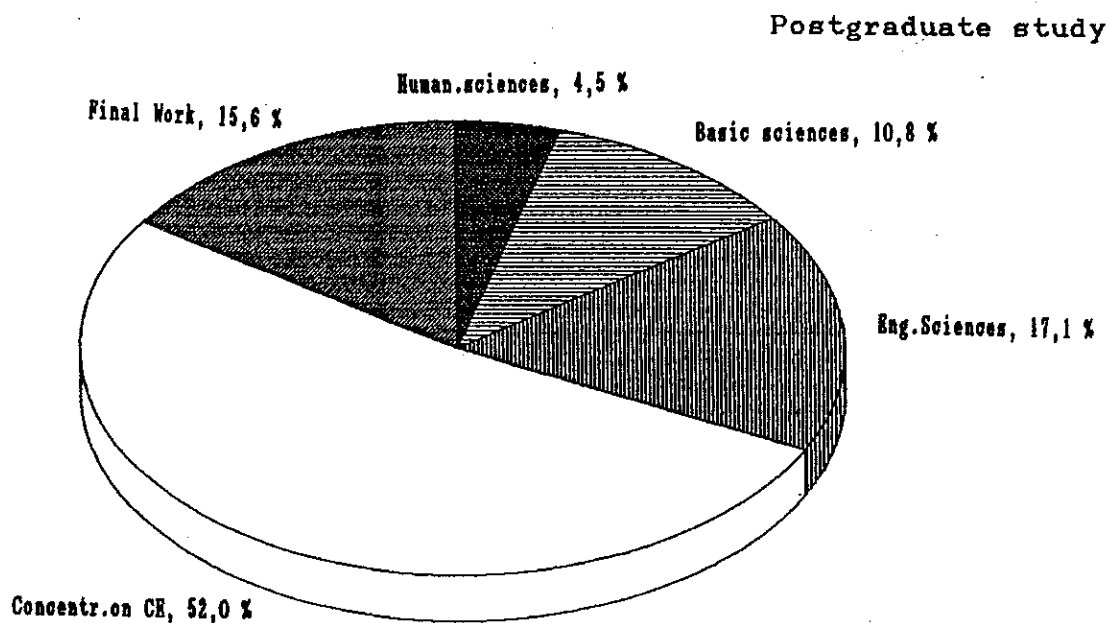
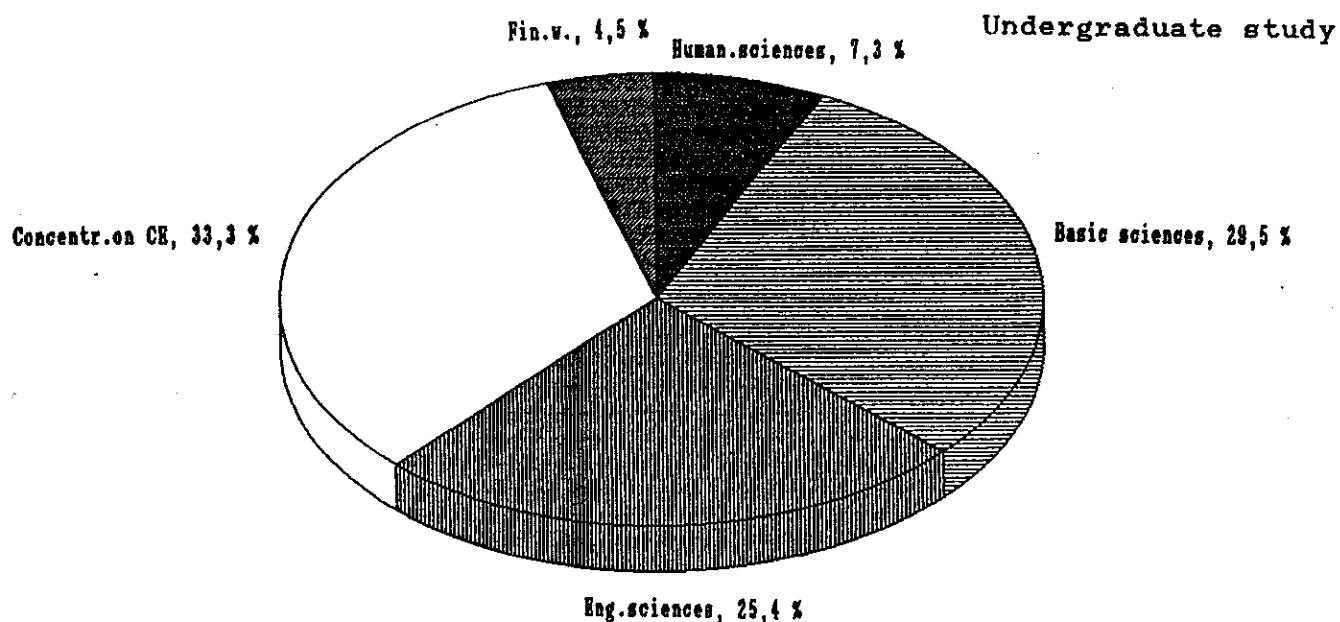


Fig.3. Representation of the different types of teaching in undergraduate, postgraduate and doctoral study of CE and Surveying.

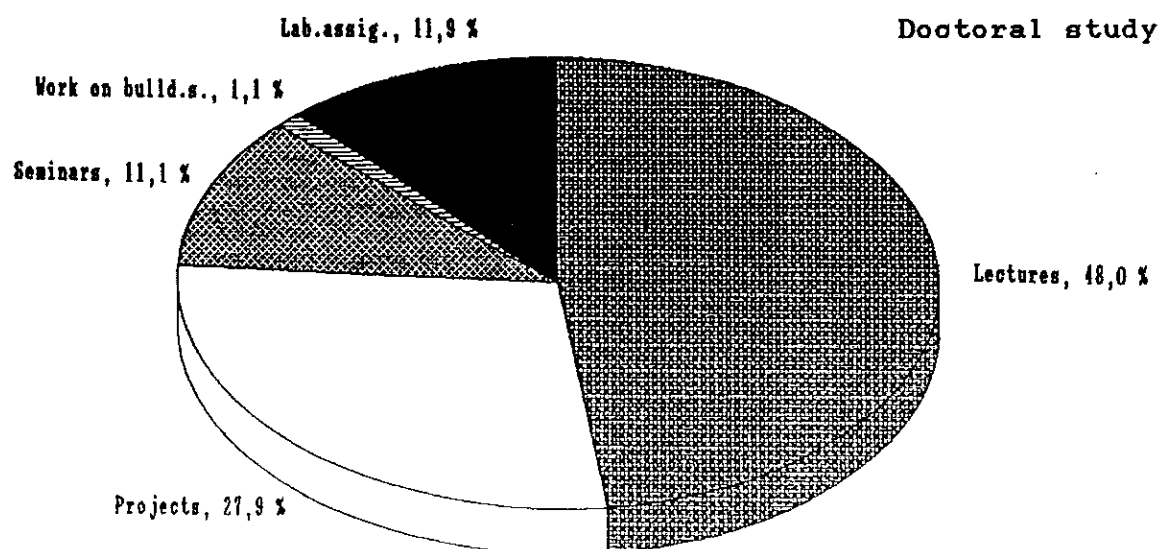
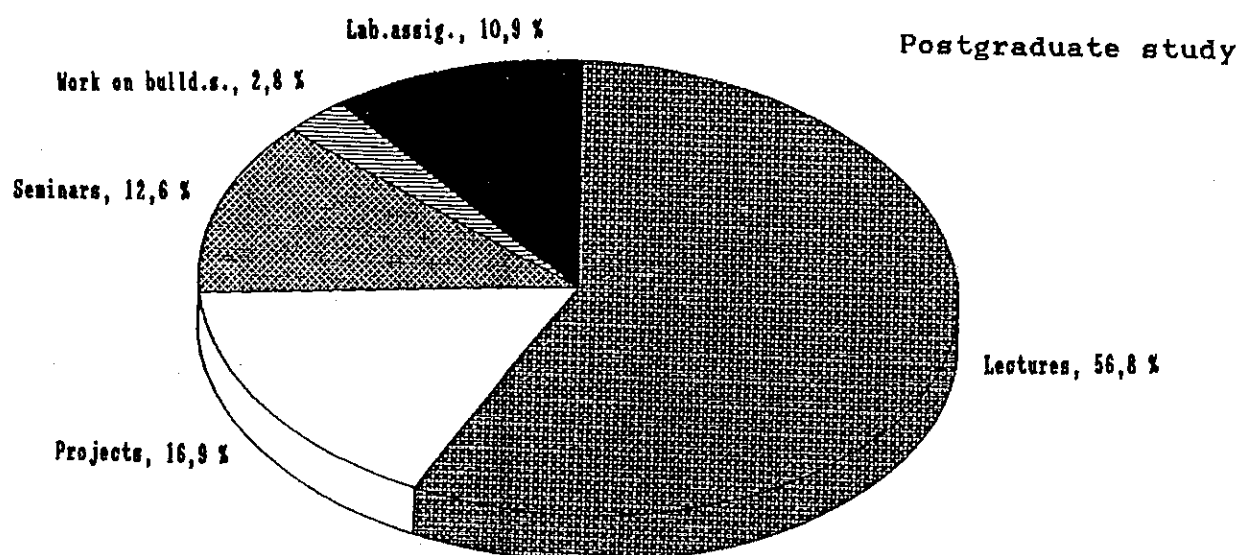
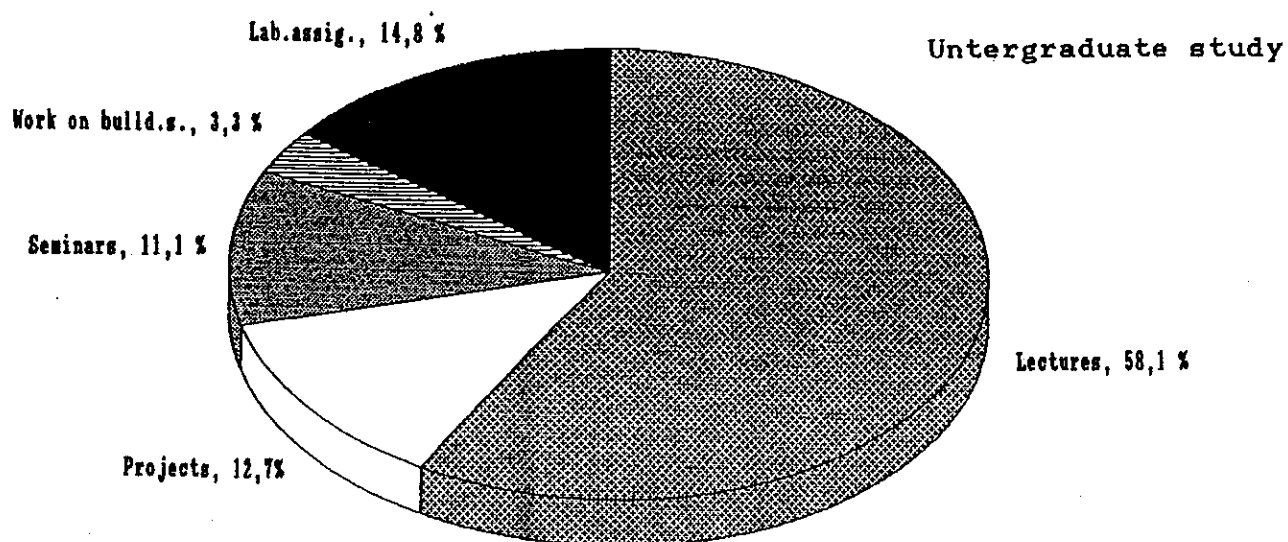


Fig.4. Correlation analysis between the number of teachers and the number of students.

Total number of teachers vs. number of students

$$NT = 5.3289 + .09087 * NS$$

Correlation: $r = .80028$

