

THE EFFICIENCY OF OUR EDUCATIONAL METHODS AS SEEN BY GRADUATES

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Abstract

Few words are dedicated to educational methods and models even in the specialized literature of university education, whereas these are important components of the process which significantly influence its success and productivity. The analysis of the results of a survey reveals that the majority of graduates deem interactive methods more successful and efficient, however these methods are applied in a smaller part of the training period than direct teacher-centred methods.

Keywords: university education, teaching methods, efficiency, direct control, interactive methods, timeframe of training.

1. The Justification of Methodological Research in the Field of University Education

University education and the word ‘education’ itself denotes a pedagogical activity that is aimed at the enhancement of learning, the acquisition, comprehension, application, systematization, memorization and revision of information. Education is the basic condition and at the same time the means of the shaping of skills, aptitudes and proficiencies [1]. Significantly less attention is paid to educational methods in higher education than in general education even though the applied method has / may have a great effect on its success. The efficiency of methods may be verified with the aid of so-called longitudinal monitoring and surveys with control-groups, but listening to the opinion of students may also be a step forward in pointing out differences of efficiency.

2. The Description of Educational Methods

Educational methods are recurrent elements of the process of education as the incarnation of the common activity of teacher and student. Educational methods are custom-tailored for specific aims and consequently they may differ to a great extent. The failure of education or its lower efficiency than expected on the basis of the ‘investment’ is often attributable to the improper selection of the educational

method. Educational methods belong to the following categories with regard to the direction of the learning process:

- Teacher-centred methods
- Interactive methods, based on the co-operation of teacher and student
- Student-centred methods

Frontal presentation and lectures are for instance teacher-centred methods.

Interactive methods, which are based on the cooperation of teacher and student, are exemplified by e.g. the project-method, the co-operative method, teamwork, the sandwich-method, workplace experience (practice-oriented training), role-play, case-study, etc.

Examples of student-centred methods designed to suit individual students include correspondence courses, modular training (with the aid of learner's guides).

The opinion of a total of one hundred primary and secondary school teachers is reflected in a research carried out three years ago, the analysis of which revealed that 60 percent of the teachers believed the success of lessons were dependent on the application of several methods [2]. No similar survey has yet been carried out among university teachers in the technical field but the opinion of teachers working in general education is worth considering. It is interesting to find out how many methods certain teachers know and use. A fifth of teachers know a maximum of eight methods, what means that the remaining four fifths of teachers know more than eight methods.

Needless to say success and efficiency have some other factors, e.g. the personality of students, the teacher's mood at a given class, the presence or absence of motivation, the personality of the teacher, the mood of students, the teacher's state of preparation, the subject-matter, the relationship between teacher and student.

3. The Description of my Own Survey Carried out among TUB Students

Students are participants of the process of education and having a grown-up, mature and established personality they may teach us a useful lesson about which methods they consider(ed) efficient and successful.

I observed both the written and the unwritten rules of statistical methods as I carried out my survey focussing on the Faculty of Civil Engineering among students who graduated within a randomly selected period of two and a half years. The period mentioned ran from January, 2000 to September, 2002. The questionnaire that the students received either by post or in an electronic form consisted of four parts and it was the fourth part that asked questions concerning educational forms and methods.

Of all statistical methods I applied systematic sampling, consequently all students had the same chance of becoming part of the sample, I posted the questionnaire to every fourth student (N=122). The circular diagram displays the proportion of answers compared to the full sample *Fig. 1*.

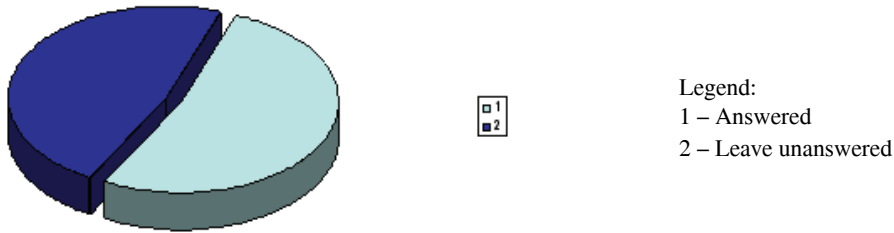


Fig. 1. The proportion of answers compared to the full sample

I used the SPSS software (Statistical Package for Social Sciences) for the statistical analysis of the answers.

The survey was based on the answers of 55 percent of the students addressed. The question asked was: *To what extent – in your opinion – have the educational methods listed below had a role in the development of your skills? Please mark your answer in each row. Mark the method you considered most successful and useful with a 5. Only put an asterisk (*) in the column if you have not met the respective educational method in the course of your university studies.*

Naturally the methods were listed in the form they appeared in the university education and easily recognizable for the students. I did not signal in the questionnaire to which of the three above-mentioned major categories each of the educational forms belonged.

The 16 educational methods / forms:

1. Practical classroom class for 20-25 people
2. Application of designer's / engineering software in the computer room
3. Learning about designer's / engineering software in the classroom, without computers
4. Watching educational films
5. Visiting producing plants of the building industry
6. Organised measuring practice sessions (in hydraulic engineering, geodesy)
7. Drawing in the classroom (using a drawing-board, rulers, and other equipment)
8. Technician's summer practice
9. Individual laboratory measuring practice or experiment
10. Frontal education (lecture, only the teacher's explanation)
11. Common tasks solved by a group of students in class with a little help from the teacher
12. Individual management of tasks with a teacher's direction
13. Observation of measurements in the laboratory
14. Work in the workshop
15. Visiting construction sites
16. Work on greater (full-term) tasks with a teacher's direction, individually or in groups

4. The Analysis of the Results of the Survey

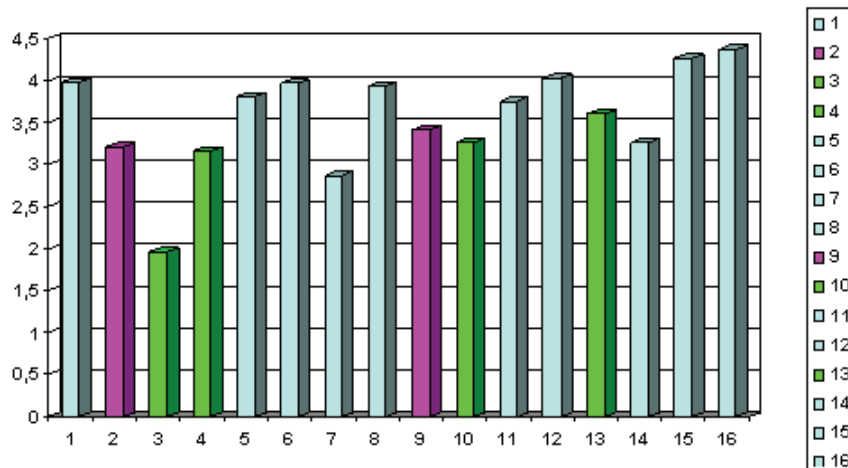


Fig. 2. The bar-chart representing the results of the survey

Legend: pale: Interactive methods dark: Student-centred methods (2, 9) half-tone: Teacher-centred methods (3,4,10,13)

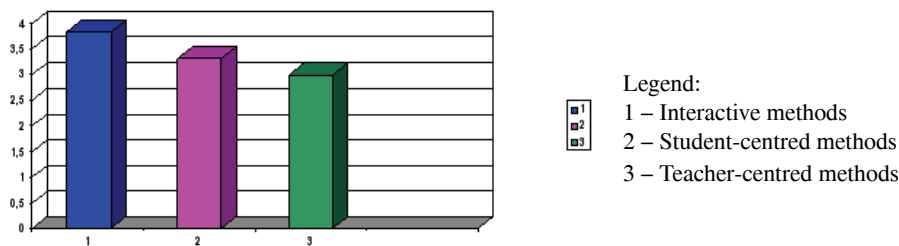


Fig. 3. The results of the methods summarized by type

We shall begin the analysis of the results with the category that received the lowest marks: column 3 of the *Teacher-centred* methods. The overall mark is 3.00, which is not a bad result. Let us see then what exactly this term, the common name of four of the present methods means.

The common characteristic of teacher-centred methods is that the student rarely or never have the right to decide, they are basically compelled to receive information and perform tasks [3]. Throughout the application of this method it is the teacher's control that predominates. It is more suitable for the transference of information and less adequate for the development of skills. It can only be successful if the students form a homogeneous group concerning their prior knowledge and

their response to motivation. With this method it is practically impossible to take individual characteristics into consideration.

The height of the middle column exceeds 3.00. This is the column of the *Student-centred* educational methods.

The general features of this method may be summarized as follows:

- The subject-matter is made easily accessible in a book or in an electronic form.
- The compilation and wording of the subject-matter as well as its completion with detailed guides requires a great mental effort, preparation from its developer.
- The student's helpers, the tutors are at the student's disposal, ready to consult with him if necessary (e.g. laboratory assistant, or the 'Help' menu of a software).
- It is the student who sets the pace of progress.

The category that students marked the most efficient is the group of *Interactive methods, based on the co-operation of teacher and student*. The mark it received is almost a four (3.82), which would pass for a nice average result in a lecture-book.

The majority of interactive methods is focussed on a problem and the acquisition of the subject matter actually takes place in the course of the solution of the problem. The teacher's duty here lies mainly in selecting tasks which enhance thinking and the solution of which really helps in the achievement of our educational aim.

The six methods that the students found the most successful and efficient:

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16. Work on greater (full-term) tasks with a teacher's direction, individually or in groups
 15. Visiting construction sites
 12. Individual management of tasks with a teacher's direction
 1. *Practical* classroom class for 20-25 people
 6. Organized measuring practice sessions (in hydraulic engineering, geodesy)
 8. Technician's summer practice
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5. Conclusions and further Steps of the Methodological Research

It is worth comparing these results with the subject requirements, curriculum and the teaching practice of the ten semesters of university education. Provided that a student of civil engineering (specializing in structural engineering) attends classes in harmony with the sample curriculum including facultative subjects (but not including languages classes and sessions of physical education), (s)he participates in

approx. 3500 contact classes. Approximately 1820 of those classes are lectures and 1680 are practical classroom classes, part of which are delivered like lectures to perhaps a smaller audience. Students are compelled to spend 19 days (approx. 153 measuring practice sessions) in camps organized by the university [4]. (The technician's summer practice is no longer in the scope of the university, its efficiency depends entirely on the student's selection of a workplace.) It is in the course of practical classroom classes, measuring practice sessions and at real workplaces that interactive methods, which were considered most efficient by the students, may be applied successfully. That is because the application of interactive methods often require a change in the learning environment. In most cases it necessitates the rearrangement of the classroom, alternatively the laboratory, the library or "life" itself may serve as the scene of the class.

Such classes are much more difficult to organize. A thorough look at the training process of civil engineers reveals that there is hardly any opportunity provided or time devoted to educational forms organised for a smaller number of participants.

The dichotomy of mass education and élite-training is a subject much discussed in professional circles as well as the issues of market-oriented training and education focussing on practice. It is due to the circumstances that university education is based on lectures delivered to large audiences for the increasing number of students and the constant number of teachers leaves no other option for the faculty to provide the number of contact classes prescribed as a condition of the acquisition of the qualification.

The survey just described constitutes but a small segment of the research concentrating on various methods of university education and their respective efficiency. As a further step those methods and possibilities will have to be examined in detail which give students participating in the training of civil engineering marketable skills, a learning more suited to practical purposes. The answers given by former students, who now have a work experience of two to four years, in response to the questions of the survey direct our attention to interactive methods.

The elevation of the standard of the training of civil engineers requires pedagogical, methodological research but it is evident in the light of this survey that by altering the timeframe made available for the training and through methodological reform education may be made more productive.

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