

"PROBLEM ORIENTED TEACHING IN THE FACULTY OF ENGINEERING,  
CONCEPT AND IMPLEMENTATION"

By: Beat Gruber\*

Teaching and learning concepts have an impact on the activities of teachers and students towards the developing process of a nation. It is important to find methods which show that academic training is of immediate practical use in helping this process. Study confined to theory or to the systematic structure of a textbook does not reveal this unless care is taken to relate the material to the exceptional problems of a changing society and technology. Problems of this kind when tackled realistically are very complex and are full of contradictory requirements. They cannot be devised at a desk. Neither is it sufficient to separate a specific problem and analyse it in depth, because the practical realization of a solution obtained in this way would probably lead to insuperable difficulties.

The idea of 'problem oriented teaching' is to demonstrate and emphasize the practical implementation of problem solving rather than the approach of theoretical analysis. It should direct the activities of students towards producing original and workable solutions and away from adapting existing theories. The student should be motivated by the challenge of a problem rather than by the splendour of a theory, and he ought to develop the awareness and sense of perception to identify true difficulties. To reach these aims some changes are needed in teaching methods. Students must be allowed some freedom of study if they are to become committed to a task. Solid teamwork must be carefully developed to take the place of competition. Both factors should be considered when work is evaluated, and the student must share responsibility for his own assessment.

During this term the second year civil engineering students made an effort to approach these objectives in the subject of 'Traffic Engineering' which covers traffic measurements and

---

\* Lecturer, Department of Civil Engineering, University of Dar es Salaam.

traffic flow characteristics. Some hours were spent in studying background information about Tanzania. The class then split into six groups of five students. Each group had to select a topic for study from a given set of roughly defined problems covering the most important areas of the subject. Confronted with the problem to go out and collect traffic data, the groups had to define the objective and site of the study, to limit its scope with regard to the available resources and to organize the field work. The know-how and experiences of the groups were disseminated by means of a group speaker in plenum. The theory was introduced according to the state of the study and on request from the students. During a first site visit the groups checked the feasibility of the study and collected general data needed for a detailed schedule of the field work. Operational methods had to be developed by the groups. Statistic problems were revealed and had to be handled in the class. Some groups had to contact officials and experienced the reactions of the public. The students decided on the specification of the study according to the circumstances and depending on their interest. They were asked to report on the results in a comprehensive way by reflecting on the reason for doing the study, the compatibility of the results with the theory and the possibilities to improve a given situation.

The learning process has been recorded in a workbook: each meeting is reported by a different student who summarizes the main findings of this class and who gives his individual opinion on the progress of the work. Individual feelings and opinions are preferred to a pretended class agreement. They detect psychological aspects of the learning process and may reveal misunderstandings. This feedback allows the teacher to make clear his objectives and to adapt teaching to the classroom situation. The concept can be evaluated at the end of the term and changed if necessary.

During this term difficulties arose which reflect the defects of a conventional teaching concept: the students were reluctant to leave the rigid instruction pattern which seemed to them to give security but in fact restricted the development of individual abilities.

The students expected the challenge to come from the teacher rather than from the problem. There was hesitation when common-sense was needed to approach unknown areas without the help of an extended theory. Difficulties appeared when needs for specific theoretical information had to be formulated by the groups. The dissemination of know-how and experience of the respective groups in the plenum was not efficient and training is needed in methods of briefing.

In general the students approved of the concept and took an interest in improving its method. Problem oriented teaching aims eventually at an interdisciplinary approach to the tasks of an engineer and in the long run a project oriented curriculum could help to achieve this.

\* \* \* \*