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ABSTRACT

This paper reports contributions that students have made in the development of self-instructional materials in dentistry. It begins with a description of forces that encourage utilizing students as members of the instructional development staff and reports the role students have played in attempts to develop an individualized curriculum in dentistry. At the University of Michigan School of Dentistry, preclinical dentistry courses are laboratory analogues of clinical dentistry; that is, students perform on simulators the procedures they will later perform on patients. The body of this paper is concerned with the efforts of the preclinical team in developing curricula. A substantial portion of this course is now in self-instructional modes and the entire course will be prepared when it is required for students who enter in the fall of 1974. (Author/PG)

Roles of the Student in Development of Technic Courses in Dentistry*

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This paper reports contributions that students have made in the development of self-instructional materials in dentistry. It begins with a description of forces which encouraged us to consider utilizing students as members of the instructional development staff and reports the role students have played in our attempt to develop an individualized curriculum in dentistry. Although our experience is limited to dentistry, we believe that students may be valued colleagues in instructional development in other disciplines, especially when content experts' time is limited and the nature of the materials to be developed makes it very difficult or inefficient for instructional development staff to master the content and develop materials themselves.

In July, 1972, The University of Michigan School of Dentistry was the recipient of a federally funded grant which had as its primary objective the development of an individualized curriculum. The project required that it be possible for students to proceed at differing rates to the attainment of the DDS degree on the basis of established proficiencies. By implication, all materials would be self-instructional and lecture courses would be ruled out as a mode of instruction. The individualized curriculum would be offered initially to 30 students entering as freshman in September, 1974 and each successive year

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30 new freshman would enter the "Pilot Project in Dentistry (PPD)." The plan is for PPD students to be enrolled in the individualized curriculum throughout their years in the program. Other students, who will comprise about 80% of the class initially, will continue in the current curriculum. However, if the Pilot Project is successful, all students may eventually be in an individualized curriculum.

Although administration had been active in initiating the proposal and its submission was endorsed by all departments, the primary responsibility for implementing the project was assigned to the Department of Educational Resources. At the onset of the project this Department was comprised of few members most of whom were media experts and none of whom were dentists. Although some funds were provided for faculty release time, these funds were limited. More critically, faculty time was already committed and for many departments it was not possible to delegate existing course responsibilities and formally designate time for instructional development. Hiring dentists specifically for the purpose of developing materials was rejected as an alternative, since faculty were understandably reluctant to assign the role of content expert to persons who were not identified with, and recommended by department members themselves.

During the first months of the grant, instructional development staff were recruited and two instructional teams created, one of which would be responsible for courses in the biological sciences and the other, for courses in preclinical dentistry. Preclinical dentistry courses are laboratory analogues of clinical dentistry. That is, students perform on simulators the procedures they will later perform on patients.

The role of members of the preclinical instructional staff

differed from that of their counterparts in the biological science group. The biological science team members had extensive background in biology and chemistry and the instructional objectives were almost entirely within the cognitive domain. Thus, members of the group, in consultation with subject matter experts, served as co-authors with faculty in the development of textual materials and slide tape series. Since none of the members of the preclinical team were dentally trained, cognitive content was learned by reading textual materials and observing students in the laboratories. Because a major proportion of preclinical objectives required the acquisition of fine-grain psychomotor skills, it followed that preclinical courses might require the demonstration of some dental procedures on videotapes. This necessitated use of faculty demonstrating those procedures for presentation in that medium. As a result, in preclinical course development, we were more dependent upon faculty.

The remainder of this paper will be concerned with efforts of the preclinical team.

Initially the task appeared to be, if not simple, at least well defined. We would begin with a specification of skills and knowledge required of practicing dentists, define instructional objectives, develop criterion tests which operationalized objectives, select instructional methods which had the highest probability of success, develop materials, assess the effectiveness of materials on the basis of student performance and revise materials until they met validation criteria. This strategy soon proved to be unworkable. Content faculty were simply not available for the heavy expenditure of time required. The best prediction was that, if we employed the traditional strategy, we would not get beyond the stage of stating instructional objectives

until we were well into the grant period. For this reason, we elected an alternative strategy which, when necessary, permitted limiting faculty contributions to those activities for which their unique skills were required. The extent of faculty involvement would vary as a function of the amount of time particular departments had available for instructional development.

As an alternative to asking faculty to define instructional objectives, instructional staff inferred objectives and criteria by various methods. Existing tests were analyzed as one basis for identifying objectives. Staff attended, and taped for transcription, lectures given in each preclinical course. We observed and recorded interactions between faculty and students as the various procedures were carried out in the laboratories. The interactions included requests from students to instructors for assistance, guidance, clarification and evaluation. Photographs were taken of preparations which met the instructor's standard or demonstrated common errors. Essentially, we use courses as a data base from which we could extract content materials, objectives, criteria and instructional deficiencies for each course.

The conditions described led us to consider the merits of hiring dental students to work with faculty and our staff in developing instructional materials. Their roles would in some ways be unique, and in some ways similar to those of content experts or instructional development staff. Their primary strength was their content knowledge and technical skills in preclinical dentistry. For the summer of 1973, each faculty member involved in development of a course selected a student with whom he or the instructional specialist would work. All of these students would serve as consultants in the several courses

under development. At the beginning of the summer, courses were in different stages of development. For example, in one course, graphically illustrated procedural manuals and videotapes transferred to cassettes for individual viewing had been developed. In a second course, procedural manuals and lengthy videotapes edited to much shorter versions had been produced and plans were underway to substantially modify the course during the summer. In a third course, instruction had been almost entirely in the form of lectures, text and laboratory teaching. In this course, it would be necessary to design, develop and produce self-instructional materials for the curriculum. The central task in the three courses and, thus, the role students played varied.

In the course already developed in self-instructional form, the goal was to improve existing materials. Five students reviewed and made recommendations for modifying the procedural manuals for completeness and clarity. Two students studied the data from the laboratories which identified frequently occurring problems. They also studied short critiques of these manuals that had been made by students who had taken the course. On the basis of information obtained from these sources, they edited the handouts for clarity and expanded segments pertaining to parts of procedures with which students had special difficulty. They also suggested additional graphics or modifications in graphics. These recommendations were submitted to the faculty member for use in revising the manuals. A second task for this course was to develop test items which would be administered before students began work on each procedure. Previously, test items had been designed only to encourage students to read the manuals. These items had been drawn directly from the handout and assessed

isolated recall. The new items were designed to test whether students had mastered content required for successful execution of the procedures. Student test writers reviewed the faculty-student interaction information collected in the laboratory and drew upon frequently made errors to construct items. The plan which has now been effected was for the student to take a test and to be given immediate feedback before beginning a procedure so that he could avoid errors that had been known to occur frequently. These students, who themselves had just completed the course, were able to draw upon their own experience both for content of items and for reasonable distractors. Questions were reviewed and edited by the subject matter expert.

In the second course which was to be revised by faculty and staff, a student reviewed lectures, interactions and procedural manuals. For each procedure he identified steps, criteria and problems encountered in the laboratory and solutions provided by the faculty. His work was used by instructional development staff to suggest revisions in the manuals and to prepare criterion checklists. A paper by Francile Clevenger and Joseph Silvian presented in another session describes another contribution of students which was suggested by the work of Abedor. The sophomore and junior courses were offered solely for the purpose of course modification to students who would be taking the course the following year for credit. These students completed procedures in the same manner as they would during the school year using existing instructional materials. They then filled out evaluation forms for each procedure. After completing a procedure, they met with the faculty member and instructional development staff in debriefing sessions. Modifications in the procedural

handouts were made immediately on the basis of student recommendations and evaluation of the products that had just been completed in the laboratories. For example, the shorter forms of the videotapes had in some cases deleted segments that, on the basis of student performance and recommendations, appeared to be necessary. These segments still available in the longer versions were added. In other cases, entry behaviors that had been assumed were lacking and additional instruction was added. Criteria for judging the adequacy of a product were delineated more fully when students reported standards of evaluation were not sufficiently specific. Portions of the manuals were expanded or edited for clarity, again on the basis of student critiques. Both sophomore and junior courses have been offered on an individualized basis and the criterion check lists developed for each procedure have been used to identify problems that remain. Revisions of these courses will continue. Data collection in practical exams indicate a high level of performance has been attained using materials developed or revised during the experimental offering of the course.

In the course which was to be prepared rather than revised for self-instructional use, a student reviewed text, lectures and laboratory interaction data. The latter provided information concerning difficulties encountered in the laboraotry procedures. From these sources he generated a flowchart and criteria for acceptable products. The faculty member enlarged upon the student's work and wrote a handout to further explain the procedure. The same student wrote draft versions of handouts teaching technics for cavity preparations and developed materials teaching the use of dental equipment and use of instruments. For some materials students served as "talent" for

rough draft photographs which would require faculty performing those tasks for final copy.

In this course, students' content knowledge and recent experience learning the material provided an important resource for instructional development staff. A major value of student and staff produced materials was the impetus they provided to engage the interest and efforts of faculty whose time was heavily committed to other responsibilities.

A substantial portion of the course is now in self-instructional modes and the entire course will be prepared when it is required for the Pilot Project students who will enter in the Fall of 1974. The effectiveness of materials developed thus far is now being evaluated in laboratory observations and from students' reports of difficulties encountered in executing the various tasks.

Although we have departed from the conventional method of course development, it is appropriate to say we have adapted the classic method to the constraints of the existing system. Students have proved to be invaluable in offering skills and knowledge for course development and for assisting instructional development staff to enlist active cooperation of faculty. We recommend that others engaged in similar enterprises consider students as potential collegues in their efforts.