DOCUMENT RESUME

ED 093 920 TM 003 737

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TITLE Systematic Evaluation Strategies for Innovative Programs in Health Professions Education: Need, Function and Components.
PUB DATE [Apr 74]
NOTE 11p.; Paper presented at the Annual Meeting of the American Educational Research Association (59th, Chicago, Illinois, April 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Criterion Referenced Tests; *Evaluation Methods; *Formative Evaluation; *Health Occupations Education; Innovation; *Program Evaluation; Simulation; Summative Evaluation

ABSTRACT

As change occurs in various health sciences programs, evaluational strategies should be developed so that adaptive decisions may be made. Evaluation models taking into account inputs, methodology, and outputs (Stake, 1967, and Astin and Panes, 1971) need examination. Alternative measurement instruments for formative and summative evaluations, including simulation techniques (McGuire and Babbott, 1967), need consideration. It is particularly important to define adequate criterion levels of performance, including analysis of the implications of criterion-referenced measurement, (Popham and Husek, 1969). Systematic evaluation strategies should provide reliable and content-valid information from which decisions can be made concerning adequacy of student preparation as compared to content experts' a priori academic judgments. (Author)

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Systematic Evaluation Strategies for Innovative Programs in Health Professions Education: Need, Function and Components

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Paper presented to the Health Science Special Interest Group, at the meeting of the American Educational Research Association, Chicago, April 17, 1974.

With the existing demand for increased health care delivery, the various health science programs have attempted to expand and/or modify their curricular structure. This has been done primarily in response to a perceived need to provide alternative educational experiences which hopefully allow the student to proceed more rapidly through the curriculum while maintaining appropriate professional standards.

These modifications have frequently been made in an attempt to obtain federal funding without the corresponding systematic planning and/or evaluation needed for these programs. While models for specific implementation of strategies do not exist, there are models which discuss in general terms the design and evaluation of educational programs Stake (1967), Metfessel and Michael (1967), and Astin and Panos (1971). Each of these models is meritorious and the authors of this paper do not intend to present a new and unique approach to the problem. However, health science programs have some characteristics which need special attention and it seems appropriate to attempt to specify a systematic strategy which could be used to judge the proposed merits of an innovative curricular program.

The authors will attempt to present the need for such a systematic strategy, the functions it may have and, finally, discuss some of its components. In this paper, which is basically developmental in nature, the authors will not attempt to be comprehensive but rather point out the areas they see as being of prime importance.

NEED

The need for a systematic evaluation strategy is multi-dimensional. Three major reasons for developing such a system are:

1. Validation of funding (federal, state or private).
2. Identification of student proficiencies and deficiencies.

and

3. Accountability - which is broadly defined here as the effectiveness of the various educational processes being used in a particular system.

The large sums of money being invested necessitates that methods be developed to review the status of a given program in an objective way. A review will not always be oriented only at the determination of specific student performances but should include the degree to which the materials being developed are likely to facilitate the goals set forth in the planning document. Any modification to the original program should be defended with reference to specific constraints, not previously identified, which may necessitate alternate strategies. These might take the form of lack of physical resources, administrative cooperation or other factors. A specific change should be logically defendable and evidence should be gathered regarding its congruity to the program as well as its effect on students' terminal performances.

The second and most obvious need is that of identifying student performance capabilities. Without a systematic strategy specific student deficiencies may not be identified, with the end result being the certification of an unqualified health professional. Equally important is the identification of student proficiencies which may lead to the conclusion that the program's emphasis is in the wrong area or areas.

The emphasis here should be on the evaluational data being detailed enough to allow for diagnostic interpretation and adaptive curriculum modification where indicated. A particular problem may be overlap or gaps in the content of the curriculum due to lack of coordination between the various teaching departments in a health science institution.

Finally, the evaluational strategy should provide accountability data. At first impression this need appears to coincide directly with the first, validation of funding. However, accountability here is used specifically to deal with the identification of particularly efficient or inefficient techniques or processes being used to transmit the content contained in a segment of the curriculum. Here again the data gathered should be detailed enough to allow for diagnostic decision making. The cost per student should be one factor carefully considered in this paradigm.

FUNCTION

The function of a systematic evaluation strategy is to provide multiple pieces of data which allow the educator to determine at various steps the status of students in the program with regards to the overall structure of the program. At each step in this process a feedback loop needs to be included which allows for adaptation of the program based on the available data. The three primary levels of assessment necessary to make comprehensive decisions are presented diagrammatically in Diagram 1.

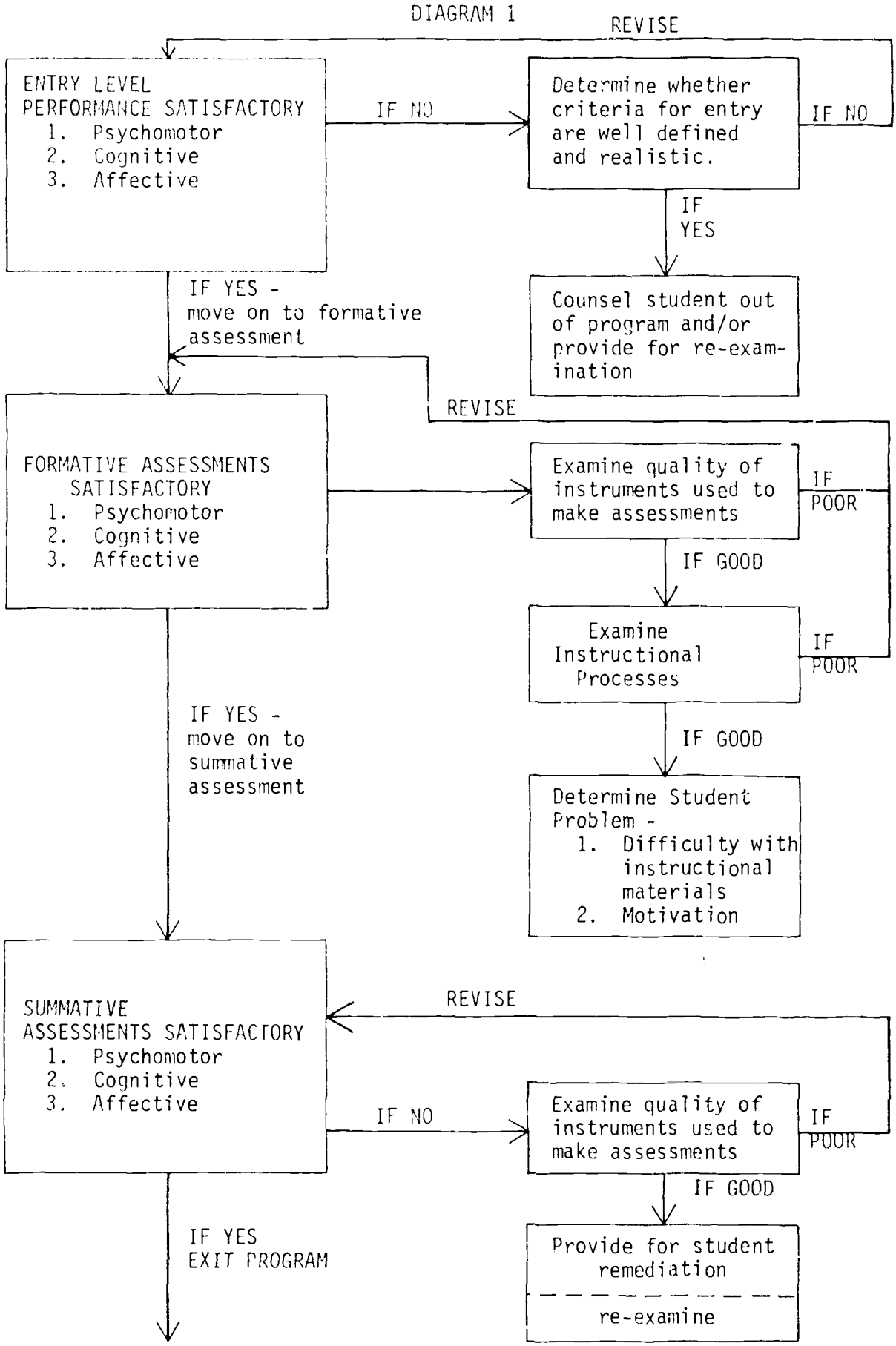
An effective evaluation strategy must be a dynamic and continuous process. As is indicated in Diagram 1 the various levels of evaluation adapted from Bloom et al. (1971) are used to assess both student and program status from entry through final exit.

The other important factors in this systematic approach are that the assessments are made at all levels and for all domains of the student's performance and that various checks are made on the system at each stage. The components of this system will be discussed in the next section.

COMPONENTS

Before identifying the various components which are needed in a functional system as outlined in Diagram 1, the relationship between curriculum design and evaluational design should be clarified. Davis, et al. (1974) indicate

DIAGRAM 1


REVISE
ENTRY LEVEL PERFORMANCE SATISFACTORY
1. Psychomotor
2. Cognitive
3. Affective
IF NO
Determine whether criteria for entry are well defined and realistic.
IF NO
IF YES
Counsel student out of program and/or provide for re-examination
IF YES - move on to formative assessment
REVISE
FORMATIVE ASSESSMENTS SATISFACTORY
1. Psychomotor
2. Cognitive
3. Affective
Examine quality of instruments used to make assessments
IF POOR
IF GOOD
Examine Instructional Processes
IF POOR
IF GOOD
Determine Student Problem -
1. Difficulty with instructional materials
2. Motivation
IF YES - move on to summative assessment
REVISE
SUMMATIVE ASSESSMENTS SATISFACTORY
1. Psychomotor
2. Cognitive
3. Affective
IF NO
Examine quality of instruments used to make assessments
IF POOR
IF GOOD
Provide for student remediation
re-examine
IF YES EXIT PROGRAM

that good instructional design occurs when goals are specified prior to the selection of methods. Prespecification of goals allows the identification of objectives, instructional procedures and evaluation methods. Implementation of a systematic evaluational strategy provides feedback, regarding the objectives and instruction, that produces a cohesive and interactive curriculum. A health science college, whether considering adoption of an innovative new program or continuance of a fairly traditional program, should look carefully at the total curriculum.

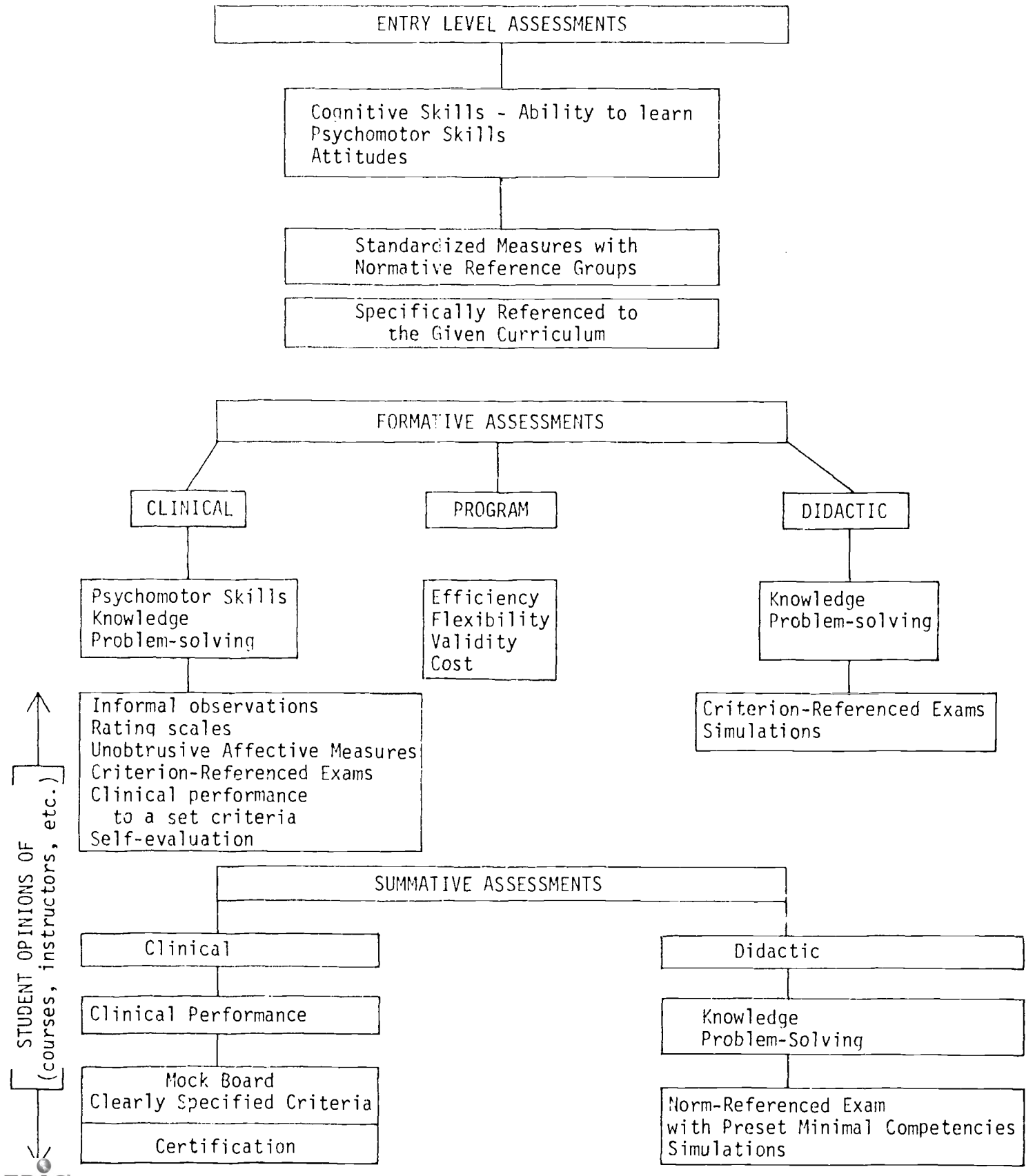
What components should the evaluation segment of this overall design process have? Metfessel and Michael (1967) point out the necessity for multiple criterion-measures when evaluating a program. The function of multiple measures is to alleviate possible misinterpretation of data gathered from only one source which may have a substantial error component. Since in a health science college both clinical and didactic phases of the curriculum need to be evaluated, multiple measures must be identified for both of these phases.

Diagram 2 presents in concise format some of the needed measures in each of the three major areas of evaluation. Each level of assessment in this model has some unique component thus reflecting the changing role that is played by the evaluation process at each level.

Entry Level Assessments

Entry level assessments are conducted across all domains of performance and are specifically referenced to the goals of the curriculum. Since applicants to health science institutions are generally highly qualified and since little behavior change can be expected prior to program entry, acceptance decisions are made on a normative basis taking into account both academic skills and affective predispositions. The addition of an affective dimension can

DIAGRAM 2


ENTRY LEVEL ASSESSMENTS
Cognitive Skills - Ability to learn
Psychomotor Skills
Attitudes
Standardized Measures with
Normative Reference Groups
Specifically Referenced to
the Given Curriculum
FORMATIVE ASSESSMENTS
CLINICAL
PROGRAM
DIDACTIC
Psychomotor Skills
Knowledge
Problem-solving
Efficiency
Flexibility
Validity
Cost
Knowledge
Problem-solving
Informal observations
Rating scales
Unobtrusive Affective Measures
Criterion-Referenced Exams
Clinical performance
to a set criteria
Self-evaluation
Criterion-Referenced Exams
Simulations
STUDENT OPINIONS OF
(courses, instructors, etc.)
SUMMATIVE ASSESSMENTS
Clinical
Didactic
Clinical Performance
Knowledge
Problem-Solving
Mock Board
Clearly Specified Criteria
Norm-Referenced Exam
with Preset Minimal Competencies
Simulations
Certification

only be accomplished and justified when the goals of the specific institution are clearly explicated.

Formative Assessments

The formative evaluation process is the most complex, primarily because it is where the action is. Formative evaluation is in essence a continuous process which involves providing the student with multiple indications of his success with the subject matter being studied.

An emphasis is placed on criterion-referenced evaluation at this level for two reasons. The first involves the goals of health science education. A student who leaves the academic environment to enter one of the health care delivery fields is expected to not just be better than another graduate but rather to have "mastered" the appropriate skills which were established by content experts in the field. Criterion-referenced evaluation provides the framework to build this type of system. The second reason for using criterion-referenced evaluation is explicated by Pophan and Husek (1969). They argue that criterion-referenced tests are devised to make decisions both about individuals and treatments, e.g., instructional programs. If for instance a criterion-referenced measure based on a set of instructional objectives is developed and administered to appropriate learners after their completion of the instructional sequence dealing with the objectives, one could reach a decision regarding the effectiveness of the sequence.

Simulation types of exercises could also be applicable to this type of system. Simulation of patient management situations as described by McGuire and Babbott (1967) provide the opportunity for a student to practice higher level problem solving skills. An additional benefit of simulation is that the learner can receive immediate feedback regarding the consequences of his selected approach, both positive and negative.

A last point of emphasis regarding the formative level is that affective measures should be carefully used to determine the student's growth in this area. The measures should be generally unobtrusive and involve informal observations as well as formal measures using carefully devised and standardized rating forms. These ratings should not be oriented towards making comparisons between students but rather at describing the student's behavior in an objective manner.

Clinical performance should be judged using a carefully agreed upon set of criteria. Students should be encouraged to make self-evaluations and to compare these to the evaluations of the faculty. If the health science student is to progress to an independent stage by graduation, he must be given the opportunity and training to facilitate this independence.

Summative Assessments

The major concern of the authors is with evaluation which takes place as part of the learning process, however the final assessments of a student and how they relate to the ongoing evaluation should be briefly mentioned. In health science institutions these final assessments usually take the form of certification or licensure examinations.

An appropriate technique to use in assessing non-clinical knowledge would be a norm-referenced standardized exam, but one which included a preset competency level. A student would be expected to score above the competency level to pass the exam but would be ranked against his peers as well. The ranking would serve the purpose of making judgments regarding the individual's relative standing at his exit from the program. It would be necessary to determine what basic goals the various health science institutions were trying to reach and to base this licensure examination on the common goals if it was to be a valid measure.

Mock boards, within institutions, and board examinations conducted by an external licensing agency should both be based on clearly specified criteria. These criteria would be used in the formative stage to prepare the student for the end point examination.

Program Evaluation

In conclusion, a few comments on program assessment seem appropriate. While all of the measures previously discussed should provide indirect or direct evidence of program success there should be some additional comparisons made.

Student ratings of alternative course materials and instructional techniques can be an invaluable data source. If the students are asked to make objective comparisons and are provided with carefully designed rating scales to accomplish this procedure, the resultant information can be used to make appropriate modifications in course content and instructional technique.

Besides student satisfaction comparisons should be made regarding efficiency, cost, flexibility and validity of alternative programs. Where possible, alternate instructional design should be tested in an experimental setting against the existing strategy. Where this is not possible the effectiveness should at least be determined by assessing student attainment of prespecified goals.

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