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ABSTRACT

The Self-Instructional Materials Project represents a significant step toward the development of a documented, replicable curriculum for medical education. It accomplishes this by carrying out the following generally accepted recommendations in the preparation of instructional materials: 1) it provides a useful technical manual--the Directory of Self-Instructional Materials--to accompany the materials it develops; 2) it regularly revises its materials; 3) it offers continuous dissemination of new materials; 4) instructional objectives are stated in detail; 5) objectives are operationally specified in terms of student behavioral responses; 6) the value of objectives is substantiated; 7) learning activities are directly related to objectives; 8) activities are sequenced to maximize student learning; 9) evaluation strategies are reported; 10) student target groups are identified; 11) validity data are cited; 12) internal and external evidence are distinguished; 13) formative and summative evaluations are conducted; 14) both intended and unintended outcomes are reported; 15) utilization procedures are specified; and 16) basic and supplementary materials which are needed are identified. (PB)

TOWARD A DOCUMENTED CURRICULUM

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In 1967 Louise L. Tyler and M. Frances Klein published Recommendations for Curricular and Instructional Materials (1) in response to the need for a curriculum document similar to APA's technical recommendations for psychological tests or to the mental measurements yearbook. It formulated some important recommendations which might be used as technical standards in evaluating medical curricula.

Five years later, the Self-Instructional Materials Project, sponsored by the Southern Medical School Consortium, addressed itself intentionally to the above recommendations. Stuart R. Johnson and Rita B. Johnson, et al, published the Directory of Self-Instructional Materials in Medical Education (2) and attempted to document each item in its listing of one hundred and forty-eight self-instructional units.

The purpose of this paper is to show how this Directory, the first of its kind, attempts to carry out a few of the recommendations suggested earlier by Tyler and Klein.

Categories of Recommendations

The recommendations formulated by Tyler and Klein were grouped into the following categories:

I. General

II. Specifications

III. Rationale

IV. Appropriateness

V. Effectiveness

VI. Conditions

VII. Practicality

Only those principles which were implemented in the Directory of Self-Instructional Materials will be described. Out of 25 recommendations, 17 are discussed below.

I. General. Into this category fall three recommendations that are general in nature:

G1. *"When curriculum and instructional materials are developed, they should be accompanied by a technical manual that makes every reasonable effort to follow the recommendations in this document."*

G2. *"The curriculum and instructional materials should be revised at appropriate intervals."*

G3. *"Provisions should be made for continued dissemination of new materials, new approaches, and new studies."*

Discussion: In 1971 the deans of 28 southern medical schools formed a consortium to stimulate the development and exchange of self-instructional materials. Since then 1500 health sciences faculty have been trained by the Self-Instructional Materials Project to produce and revise self-instructional packages.

This Project published its first edition of the Directory of Self-Instructional Materials in Medical Education. It lists materials currently under production and gives information about the products. The Directory therefore functions as a technical manual.

Decisions regarding what information was to be listed in this Directory were made on the basis of requests from samples of the user population. Over 250 workshop participants (faculty members who were producers of materials) were asked, "What would you find useful by way of information

in a document which would list other people's products? What would you like to know about such products?"

Responses were overwhelmingly in favor of the kinds of items listed in Tyler and Klein's Recommendations. This gave project staff reason to believe that such items would be helpful to other product users in medical education and would be appropriate for listing in the first project directory.

All information in the Directory is now computerized, making easy access to a continuous updating and revision process. Pages can be quickly added or deleted. Information on any given page may be rapidly changed as 1) the producer acquires new evaluation data regarding the effects of his product on students; or, 2) the producer revises an existing package based on evaluation data he has already received.

II. Specifications. In this category are recommendations referring to outcomes, since no definitive evaluation of curriculum can be accomplished unless there are objectives:

S1. *"The manual should state in detail the objectives."*

S2. *"Objectives should be specified operationally, i.e., include behavior responses of students."*

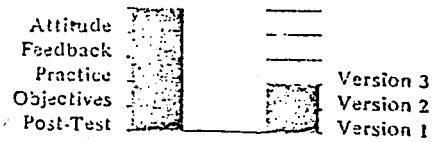
Discussion: Table I (next page) is an entry taken from the Directory of Self-Instructional Materials. It shows the cognitive objectives listed for a particular package entitled, "Diabetes Mellitus Complicating Pregnancy" (P.50). Note that the objectives are stated in terms of what the students are expected to do as an outcome of instruction. Note, also, that affective (i.e., attitudinal) measures are included as well, suggesting that affective objectives were important to the design of the package.(e.g., items 1 to 4, Student Evaluation.)

TABLE I
OBSTETRICS

Diabetes Mellitus Complicating Pregnancy (c1972) 2100-0002

Luther M. Talbert, M.D.
North Carolina
Students: Clinical
Working time: 20 min.
Availability: Contact Project Headquarters.
Notes: Contains bibliography.

FORMAT:
Typescript
Workbook



OVERALL OBJECTIVES:

Given a pregnant patient with diabetes mellitus, a description of her clinical course and laboratory data, decide on a correct course of therapy; that is, prenatal management of her diabetes and pregnancy as well as timing of delivery.

ENABLING OBJECTIVES:

1. List four deleterious effects of maternal diabetes on the course of pregnancy.
2. Describe the common problems encountered in the neonate of the diabetic mother.
3. Describe the effect of pregnancy on diabetes mellitus.
4. List two hormones which contribute to increased difficulty in management of diabetes in the pregnant patient.
5. List three metabolic effects of human placental lactogen.
6. Describe the effect of maternal insulin shock and keto-acidosis of the fetus.
7. Define pre-diabetes and describe a method of diagnosis.
8. Describe the I.V. GTT and its interpretation.
9. You should be able to describe one method of classification of diabetes as related to pregnancy.

STUDENT EVALUATION: Number of Students Responding: 14

1. I thought this package was:
   - ____ too easy.
   - 1 too long.
   - 2 too short.
   - 1 rather difficult.
   - 5 fun.
   - 8 educational.
2. I would like to see:
   - 10 more material presented like this.
   - 1 this material presented a different way.
   - 2 all of the clerkship presented this way.
3. This package:
   - 5 contained questions that were too easy.
   - ____ was too Mickey Mouse for medical students.
   - 7 really taught me a lot.
   - ____ bored me.
4. After reading this package,
   - 9 I will probably want to learn more about the subject.
   - 2 I will go to the library and read some of the references.
   - 1 I feel that the package contained all of the material I need to know about diabetes in pregnancy.

(Continued on next page)

III. Rationale. These items cover statements dealing with the process and reasoning involved in the choice of objectives, subject matter, etc.:

R1. *"The value of the objectives must be substantiated."*

R5. *"Learning opportunities (Films, texts, laboratory materials, etc.) should be directly related to the behavior and content of the specified objectives."*

R6. *"Learning opportunities must be so arranged that the behavior of the student is developed."*

R7. *"The kind of evaluation strategy used in developing the instructional materials must be reported."*

Discussion: In Table II entitled, "How To Use This Directory" (next page) mention is made of a graph found on the right hand side of each entry in the Directory. This graph tells the reader whether or not a given package has these specific self-instructional features:

Post-Test: Is there a test for students at the end of the package which is consistent with the objectives?

Objectives: Was the package designed for specific behavioral objectives?

Practice: Are there frequent practice exercises included in the material, and are they arranged so that the student practices new behavior in a graduated sequence?

Feedback: Does the student get knowledge of results regarding his practice so he can correct his performance?

TABLE II

HOW TO USE THIS DIRECTORY

Criteria for Listing of Packages:

Selection of packages this Directory was based on these criteria:

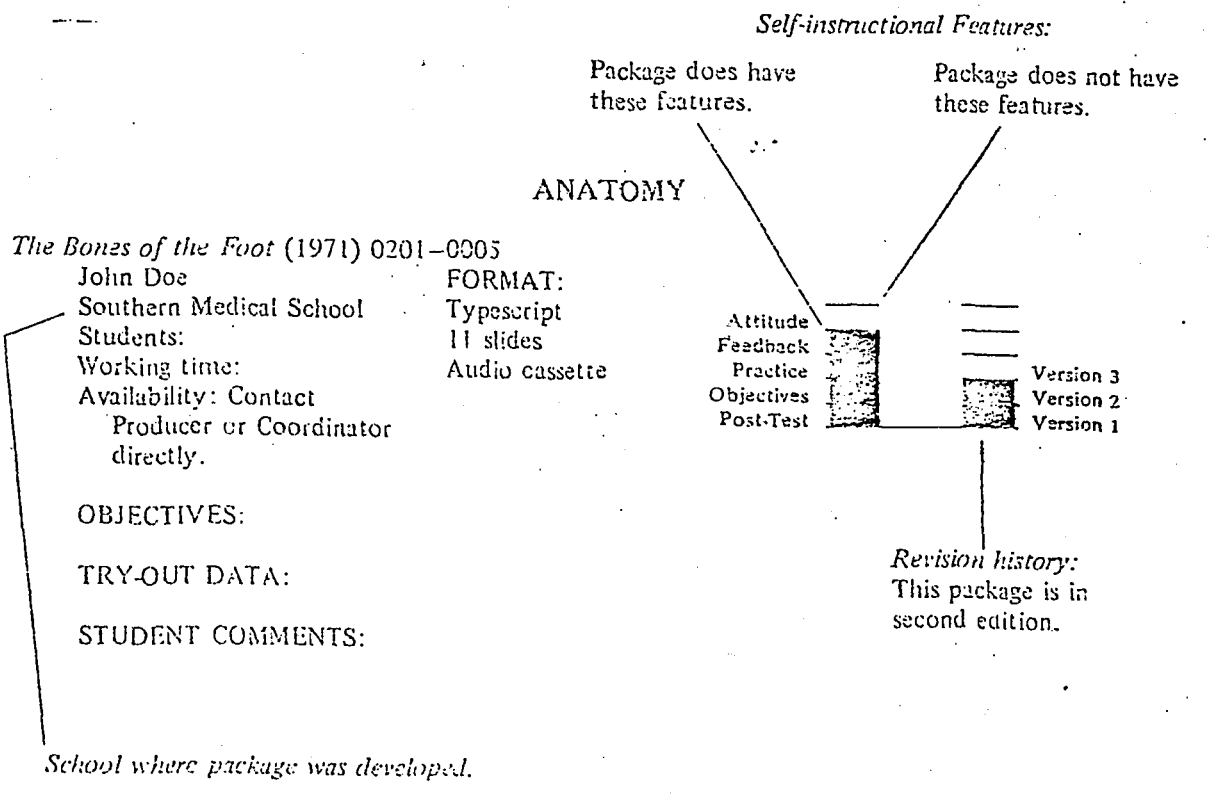
1. A copy of the package was in the Project library, and
2. The package met the minimum criteria for self-instruction; i.e., it contained at least a post-test, frequent practice and feedback.

In addition, each package ideally was designed to meet specific objectives, including attitudinal.

Arrangement of Materials Listed:

There are two parts to this Directory. The first part, on white paper, lists packages for the medical school curriculum. The basic arrangement is by subject, alphabetically. Sub-arrangement is alphabetical by title. The second part of the Directory, on yellow paper, lists packages for the allied health areas. Basic arrangement is alphabetical by specialty area, such as Dentistry, Nursing, Physical Therapy, etc. The sub-arrangement is alphabetical by title. An index to all subjects, authors and titles is provided for your convenience.

Information about each package is presented graphically in the format shown here. The objectives for the unit and any available try-out data will be given on the same page below the entry.



Attitude: Is there a measure of attitudinal change taken at completion of the package?

Version 1, 2 or 3: How many times has this package been revised? (To illustrate in Table II John Doe's unit has no attitudinal measure although it does include all of the other features. The graph indicates this material to be second version.)

In addition to the above features, the format of the learning materials is described. (For e.g., John Doe's unit consists of a typed script, 11 slides and an audio-cassette). The reader can determine for himself if the learning opportunities are directly related to the behavior and content of the objectives which are given.

Finally, the try-out data to be reported in the next Directory will include peer-review comments from faculty members who are urged to substantiate the value of the objectives for their specific content area. Peer-review sheets forwarded by Project Headquarters and completed by these specialists include questions such as, "Was the material appropriate for the target group?" "Is the content useful?" "Was the information accurate?" "Is the data up-to-date?" "Are the objectives and post-test items important?", etc.

IV. Appropriateness. This category includes statements having to do with the kind of learner for whom the material is developed, so that evaluation can be done in terms of learner characteristics.

A1. *"The kind of student for whom the materials are designed should be specified.*

Discussion: Referring again to Tables I and II we note that the target group of students is broadly defined. (e.g., in Table I, Dr. Talbert's unit is designed for clinical students.) Categories of students in the

current Directory include pre-health, pre-clinical, and clinical. Target groups in the related health areas include "Patients with Diabetes," "Family Nurse Practitioners," "Radiology Scheduling Clerks," "Dental Patients," "Medical Records Science Students," etc.

It should be mentioned that as additional evaluation data is collected, target groups may shift. For example, a set of materials originally designed for clerks in one third year obstetrics-gynecology course were used in a hospital where residents and interns were working nearby. The packages were deemed useful as "refresher material" so that now these same packages are made available to the fifth and sixth year students who need rapid review of familiar material.

V. Effectiveness. In this group are statements about characteristics which determine how the curriculum was evaluated.

E1. *"Manuals should cite sources of available evidence to document any claims made about effectiveness and efficiency."*

E2. *"Manuals should clearly distinguish between kinds of evidence presented about effectiveness: (a) internal evidence, (b) external evidence. Internal refers to features revealed through visual inspection of the materials. External refers to try-outs, revisions, etc."*

E3. *"Evaluation should be utilized when appropriate in the process of instructional development. Also evaluation should be used when materials are completely developed."*

E4. *"Effectiveness of programs should be reported in terms of program objectives as well as unintended outcomes."*

Discussion: This first Directory lists attitudinal responses (both intended and unintended) from students and faculty. The exact sources of such data are available to anyone who contacts Project Headquarters in Chapel Hill. In many cases the materials are sent to several institutions beforehand and the numbers of students trying out the package in each sample are shown.

In future editions of the Directory, cognitive achievement will also be reported for each entry. A fraction will appear by the graph showing the number of students who meet the cognitive objectives, divided by the total number in the sample (e.g., 9/10).

As Table II indicates, all evidence from students consists of try-out data, i.e., come from users who have actually tried out the material and attempted to pass the post-test. Currently, the data reported come from comments or reactions to questionnaires.

At this early stage of development, the data are used in the formative revision process. Project staff urge producers to revise continuously until objectives are met. It is assumed that as the project continues more and more materials will be completely developed so that summative evaluation data can be reported. For example, evaluation studies are currently being conducted at one university on a few well-documented materials in obstetrics-gynecology and pharmacology to determine the effect of these packages on performance during national board examinations. (reported elsewhere in Journal of Medical Education)

VI. Conditions. In this category are items having to do with the known conditions of use so that the user can determine whether his situation is similar to the setting described.

C4. "Procedures and arrangements of utilizing the materials for defined samples of students must be specified."

Discussion: Each entry specifies the format of the materials and the approximate amount of time it takes the average user to complete the material. Special conditions of use are frequently spelled out, such as in the entries below:

"This packet requires a partner." (P.40)

"This package was designed for one particular group of students. However, it may be used as a model. Unit includes synopses of possible projects."

VII. Practicality. These recommendations relate to factors basic to use in a particular setting, e.g., cost of materials, building facilities, etc.

P1. "The guide must indicate which instructional materials are required. Where supplementary materials are to be used, these should be described."

Discussion: Supplementary equipment, materials and extra requirements are added to each entry in the Directory whenever necessary to make the package complete for use by others. For example, current entries include the following:

"The Medical Letter References Handbook, January 1971, is used as text." (P.67)

"You will need as equipment: (1) Polaroid Land Camera, Model 340 or 350 (2) Olympus fiberoptic esophago-gastroscope." (P.18)

"Model Pelvis used with package." (P.47)

"Materials needed: salad dressing; apple with a bruise; suture needle and needle holder; scalpel; 2x2 sponge; tissue forceps." (P.127)

Summary

No attempt has been made to demonstrate the overall effectiveness or quality of materials which currently appear in the first edition of the Directory of Self-Instructional Materials. It has been shown instead that this document does carry out some of the technical recommendations for curriculum materials suggested by Louise L. Tyler and M. Frances Klein in 1967.

This first Directory published by the Self-Instructional Materials Project is still in process of refinement. However, it is believed that it represents a significant beginning step towards developing a documented, replicable curriculum in medical education as far as products are concerned.

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