DOCUMENT RESUME

ED 131 872 JC 760 632

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TITLE [illegible]oduction of an Automated Lesson for Use on the Audio Visual Response System.
PUB DATE 12 Jun 76
NOTE 63p.; Ed.D. Practicum, Nova University

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS *Audiovisual Aids; Audiovisual Instruction; Community Colleges; *Course Evaluation; Curriculum Development; *Instructional Media; *Junior Colleges; *Teacher Developed Materials
IDENTIFIERS Audio Visual Response System

ABSTRACT

The development, production, and evaluation of an automated lesson for use on the Audio Visual Response System (AVR System 400) is described in this paper. Establishment of learning objectives was the central focus of the lesson development process, followed by script development and the planning and design of illustrative materials. These materials were then incorporated into the AVR hardware for use with students. Evaluations, both formative and summative, were made of the resultant lesson. Peers and a hired consultant initially evaluated lesson content and objectives. Evaluation of the AVR lesson was completed by determining the effectiveness of the mode for transmitting information to students. It was noted that, while students generally enjoyed the automated lesson, almost all stated a preference for a teacher-lecture presentation. A bibliography and lesson development and production materials are appended. (Author/JDS)

PRODUCTION OF AN AUTOMATED LESSON FOR USE ON THE AUDIO VISUAL RESPONSE SYSTEM

by
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A PRACTICUM PRESENTED TO NOVA UNIVERSITY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF EDUCATION

June 12, 1976

ABSTRACT

This paper was a descriptive study regarding the development and production of an automated lesson for use on the Audio Visual Response System: AVR System 400, manufactured by Instructional Industries, which has the capacity for interrelating a student response system with a taped script and a media control system. The development and production process was detailed in a step-by-step description. Formative and summative evaluation of the lesson was also described. Criteria for student success was correct response to all test items incorporated in the automated lesson at the eighty-five percent level.

Since commercial slide-tape programs can easily be adapted to the concept of an automated lesson with the inclusion of appropriate test items, the main value of a teacher-constructed automated lesson is the personal growth experienced by the teacher as a designer of curriculum materials. It was recommended that teachers develop one such lesson as a means of increasing skill in writing objectives, sequencing content, designing illustrative materials, and constructing explicit test items. In addition, it was recommended that educational institutions encourage faculty to engage in development of innovative curriculum designs and teaching methods by providing the following:

1. Release time or extra duty pay.
2. Instruction in the operation of audio-visual equipment.
3. Consultative services.
4. Public recognition of faculty who develop curricular innovations in the institution and in the local newspapers.

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INTRODUCTION

This paper resulted from the development of an automated audio visual lession with formative evaluative components. This work was not a result of an investigative study but rather details the process used to successfully construct such a lesson. A major purpose of this study was to produce a paper that could serve as a guide to other teachers wishing to develop an automated audio visual lesson for use on the Audio Visual Response System: AVR System 400, such as the one housed in the teaching auditorium of the Nursing Education Building at Manatee Junior College in Bradenton, Florida.

When the Nursing Education Building was constructed in 1974, the teaching auditorium was equipped with the Audio Visual Response System so that learning could be enhanced through well-designed lessons that stimulated more than one sense and additionally could provide a mechanism for student interaction, so that comprehension could be evaluated with immediate feedback and further teacher clarification and explanation could be given as necessary. In short, the system is a method of reducing the time needed to achieve mastery by increasing the quality of instruction. Quality of instruction according to Carroll, as quoted by Bloom, (1973, 99) concerns the degree to which the "presentation, explanation, and

ordering of elements of the task to be learned approach the optimum for a given learner." An automated lesson allows for variety of learning styles by stimulating both auditory and visual senses. Additional flexibility results from the capability to obtain immediate feedback of student response to test items, which allows instructor knowledge of the percentage of students achieving comprehension and permits instant clarification and explanation for those students who answer incorrectly.

Production of this paper stems from the development of an actual automated audio visual lesson constructed completely from scratch. Development of appropriate objectives, an interesting script, meaningful teacher-constructed slides, and questions for measuring student comprehension and the assemblage of these components into a workable system were the concerns of this work. In short, a "how to" paper was the result of a real life project in curriculum development.

BACKGROUND AND SIGNIFICANCE

Production of an automated lesson provides a prototype for the future development of other automated lessons. An automated lesson represents an innovative teaching technique with direct and indirect effects on curriculum design. Although the technique of stimulating a few interested faculty to develop and implement an innovative process, followed by

publicity, usually fails to make a lasting impact in terms of institutionalizing an innovative idea, according to Watson, (1974, 11-12); describing the process makes it more possible for other faculty to decide to develop and use automated lessons. Additionally, according to Blanzy (1974, 45), unless everyone feels a need in the sense that an objective is not being reached or that the objective is inappropriate, there is lack of motivation for change. These factors pose definite limitations on the likelihood of future utilization of this study. An additional constraint on the likelihood of general faculty adoption of automated lessons is the fact that the equipment used to run the lesson is highly sophisticated and while not easily damaged, is formidable in appearance. Indeed the average faculty member may fear public humiliation due to inability to operate the equipment correctly and smoothly, or fear of equipment failure. Fear of equipment failure tends to interfere most with the self-image of teachers who rely on the force of personality to gain control of the learning situation, (Purdy: 1975, 10). In his study of why some community college instructors use new media and some do not, Purdy (1975, 9) found that almost all teachers believe that in order to teach, the teacher must have control over the learning environment. Teachers whose need to control is expressed in a "hands on" involvement, hesitated to utilize media systems, whereas other teachers used technical devices because they felt their control of the learning experience

was extended by reducing unpredictability and increasing the number of ways an instructor could manage the learning situation. (Purdy: 1975, 10)

A further limitation of use of automated lessons, at Manatee Junior College, is the fact that the Audio Visual Response System is housed in the Nursing Building. This is a limitation because Purdy (1975, 11) found that the use of technical innovations related closely to whether a teacher had some sense of possession or control of the media. This may be a particularly significant limitation in that the Nursing Building is located in one corner of the campus and is not visited frequently by Faculty from other Departments. Also, the Nursing Department has been more successful than other Departments in obtaining State and Federal funds which have been used, in part, to purchase an impressive array of audio visual equipment not as readily available and, therefore, not familiar to other teaching faculty. Above and beyond these environmental conditions, may exist a feeling tone of isolation and exclusion between the Nursing Faculty and the rest of the College Faculty. This feeling, which was neither investigated nor confirmed, may result from the large amount of time spent by Nursing Faculty in clinical learning facilities off-campus. When on campus, Nursing Faculty have often eaten in the Nursing Building rather than the Faculty Dining Room due to erratic class schedules. This practice reduces

communication and can lead to discomforting feelings resulting from inadequate and sometimes inaccurate information.

Additionally, limitations may exist because faculty may become disillusioned when high expectations of media are not met. Most teachers have no idea what is involved in making a fifteen minute slide-tape package. Many think it can be constructed in an hour when two to three months is more likely. (Purdy: 1975, 12) This contradiction is likely to exist to a high degree at Manatee Junior College where audio visual learning systems tend to be isolated parts of a few programs and are not generally used by most Faculty. Even fewer Faculty have developed individual instructional units or other software utilizing newer media. At the same time Faculty have witnessed several impressive displays of technical marvels including programs utilizing the slide dissolve system and a brief demonstration piece of an automated lesson. Manatee Junior College Faculty therefore are likely to possess unrealistically high expectations of media and become easily disillusioned at initial attempts to develop software, because the development process is far more complex than it appears when viewing the finished product.

PROCEDURES

Development of an automated lesson begins with the construction of objectives describing the student abilities that should result. In this construction, it is important that the objectives do more than indicate the acquisition of information. Every lesson, and especially an automated lesson, should provide for higher levels of cognitive learning. See Appendix A for sample objectives. In this example, objectives one, three, five, six, seven, eight, twelve, and thirteen represent a learning plan for the acquisition or comprehension of knowledge. Objectives two, nine, ten, and eleven represent a plan for the application, analysis or evaluation of information. (Herrscher: 1971, 18) Before beginning preparation of an automated lesson an instructor must use objectives as the basis for a systematic plan in which students will learn a means of utilizing the information portion of the lesson. Omission of a plan for developing higher levels of understanding with subsequent construction of a lesson designed only for information-giving, results in content inadequacies that cannot be overcome by technical excellence in the audio visual portion of the lesson. (Dwyer: 1975, 10) For faculty needing assistance in understanding learning levels and/or behavioral objectives, help can be obtained in the following publications:

LEVELS OF LEARNING

Bloom, Benjamin S., Ed. 1956. Taxonomy of Educational Objectives: The Classification of Educational Goals: Handbook I: Cognitive Domains. David McKay Company, Inc. New York.

WRITING BEHAVIORAL OBJECTIVES

Mager, Robert F. 1962. Preparing Instructional Objectives. Fearon Publishers, Division of Pitman Publishing Corp. Belmont, CA.

In addition to developing higher levels of learning through appropriate objectives, content determination must be made. Traditionally, content was based on current textbook material. Current practice, appropriate to an audio visual presentation designed to augment textbook learning, bases content on major ideas in the field. (Wilson: 1974, 8) The designer of an automated lesson should select content from a number of sources. Information should then be carefully sequenced beginning with the simplier material and building step by step to more complex material. A desired strategy for mastery learning is the careful, systematic design of skill development sequences which are arranged in steps from the the simple to the complex. (Roueche and Mink: 1976, 32-33)

The next step in preparing the automated lesson was the construction of a script. The process of writing a script may be made easier and sound more natural by taping a usual lecture on the material. The teacher who speaks spontaneously from an outline will find the script more natural if it is

prepared from a taped lecture. The script can be written on a special form. (See Appendix B.) This type of form allows appropriate visual materials to be coordinated with the script. Construction of a script from an appropriate outline alone may be possible for some, but an outline from which a live lecture is actually taped, followed by script writing from the tape recording was the method used most satisfactorily in the pilot lesson, and is recommended by Ryan (1975, 38).

The third procedure was the planning and design of illustrative material to be used in conjunction with the script. The audio visual system is capable of projecting two or three separate images at one time from a variety of machinery including filmstrip, slide, film loop, video tape recorder, and sixteen-millimeter projector. Most lessons would be enhanced by some combination of still and moving imagery. Appropriate illustration of the cognitive content is more important, however, than utilization of several varieties of audio visual presentations.

A well illustrated script will include a large number of pictorial displays and limit the number containing word displays alone. Often word slides can be abbreviated and a small illustrative figure or symbol can be included on the same slide. For example, a summary slide of the criteria for accurately measuring daily weight can also contain a picture or line drawing of a person on a scale. Many times a concept can be symbolically illustrated with a simple instructor-drawn

symbol. For example, in illustrating that the human body obtains water from the process of metabolism, one can show metabolism in equation form, and illustrate the concept of metabolism with a flame as shown below:

$$METABOLISM = ENERGY + CO_2 + H_2O$$

This type of representation reminds students that metabolism is a process and associates it with combustion, a previously learned concept more readily understood by many students.

This portion of the construction of an automated lesson can be a great deal of fun for the designer as he uses imagination and creativity to illustrate the highlights of the script in symbolic form. The need to design illustrative symbols will probably result in script changes as different explanations or sequences appear to be more easily illustrated. The need to illustrate tends to force sequencing of information according to priority, complexity, and/or specificity. Application of learning principles such as the following, developed by Gagne as stated in Tickton (1971, 67), tend to result from the exercise of illustrating scripts:

1. Begin by providing the learner with a meaningful structure before teaching a new principle, i.e., tell him what he is going to learn.

2. Teach from the general to the specific.
3. Learning proceeds best from the simple to the complex.
4. Meaningful learning occurs when a new idea is subsumed into a related structure of already existing knowledge.
5. Insist on mastery of on-going lessons before introducing new material.
6. Draw many relationships, similarities, differences, etc. between new and old ideas.

It is acceptable and desirable to use slides and materials already produced in an automated lesson whenever possible. After deciding on appropriate illustrative material, current stocks of audio-visual materials were inventoried to select those that could be duplicated and used in the lesson. Most often many slides will have to be made to properly illustrate the script. This will be especially true if the content has covered the major ideas in the field rather than the ideas found in one text.

Slides were planned so that each one was seen for a sufficient length of time to be meaningful to students. Designs that illustrated the overall idea of a given segment of the script were used on the viewer's left side of the screen while two or three illustrations of segment parts were pictured in succession on the viewer's right side of the screen. This technique tended to promote continuity and illustrate the larger concepts and the related content specifics to a knowledge structure.

Effective teacher-made slides were constructed using colored duplicating paper as a background and pictures cut out of out-dated professional periodicals or hand drawn by the

designer. Audio-visual departments often employ an artist who can also draw designs according to teacher specifications. Captions were done by using the typewriter with library-size type located in the audio-visual department. It was necessary to go over the type with a black felt-tipped pen since only a carbon ribbon produces type with sufficiently dark letters to photograph clearly. If captions are limited to only one or a few words, they might better be done by an artist.

Slides containing test questions require some particular attention. Option items require use of two slides. The one on the viewer's left contains the question and all selections. The right slide presents the option choices. Additional slides of the correct response are also constructed. When the correct response slide is displayed, it will be pictured along side the question so that students may again review all possible selections. It is at this time that the teacher presenting the automated lesson may wish to stop it for a time, for clarification of student understanding of the material.

When slide projectors are used for an automated lesson, it is usually more practicable to have them turned on during the entire lesson. It is then necessary to use a black slide for any portion of the script not using a slide picture. This occurs frequently when two slide projectors are used. The most effective black slide is simply a solid piece of cardboard such as the cardboard found as backing on legal pads cut into the size of a thirty-five millimeter slide. Placement of black

slides are noted on the form containing the script and illustrative materials. (Appendix B)

Automation is achieved with the placement of electronic sensors on the audio tape of the script. These electric sensors can turn projectors on or off, as well as cause them to advance or reverse. When taping, the speaker must pause where sensors are to be inserted. It may be helpful to use a colored pen to place a dot at the points requiring a sensor on the script. Use of a separate color for each machine eases the job of placing the sensors and allows for a longer pause when typing at those places with two or three different dots. Since the script for this automated lesson was to be duplicated so that it could serve as a model, and since only slides were used, positive (+) and negative (-) signs were used to indicate forward movement of the right and left projectors, respectively. Note, the use of black (blank) slides permits a system of projection in which the machine command will always be forward.

Automation is also possible in regard to the test items. The length of time required for students to respond to test items is determined on the pilot showing. An assistant uses a stop watch to measure the number of seconds needed for the students to respond. Since the audio-visuals are manipulated manually during the pilot showing, an assistant is needed to accurately measure student response time. Generally, thirty seconds allows sufficient response time for a simple multiple

choice item, while forty-five or fifty-five seconds is often necessary for a question with an option display.

An advantage of the audio-visual response system is that evaluative techniques with immediate feedback can be used to reinforce learning during the learning experience. By activating the individual desk set mechanism, student responses can be recorded and students can receive instant positive reinforcement, since the response system can be set so that the correct response will flash on and off at the individual desk set of all students who correctly respond. An important part of an automated lesson, for the audio-visual system is the periodic inclusion of test questions. Content should be designed in ten to twenty minute segments followed by questions for each segment.

Questions should stem directly from the objectives of the material covered. As much as possible, questions should require application of content, rather than simple collection and comprehension of information. The following booklet is an excellent guide for the effective construction of test items:

> Shields, Mary R. 1965. The Construction and Use of Teacher-Made Tests. Pamphlet No. 5. Code No. 14-136. National League For Nursing. New York.

Taping the script may best be done by another person, if the designer's voice is soft or in some way not appealing. There should be an effort to maintain natural voice tone and

inflection. It may be helpful to do the taping in a lecture auditorium where it may be easier to role-play an actual lecture situation, complete with gestures, thereby producing a tape with appropriate voice inflection. Taping must be done without a live audience because of the distraction of background noise. However, one or two persons could be present, if this assists the speaker in producing a natural, well modulated voice with helpful inflections. It is suggested that appropriate introductory music precede the Title slide and fade during the Title display. Music may also be used at the completion of the lesson.

EVALUATION

The lesson produced was evaluated both formatively and summatively. Initial evaluation began with peer review of the content objectives by the First Year Teaching Team, and a hired consultant. This step promoted inclusion of necessary content and exclusion of non-essential content. Information taught in a related science course was removed and objectives regarding application of remaining content were added. Additional formative evaluation from the consultant concerned the design and placement of slides illustrating the script. This task could be accomplished with the aid of a fellow faculty member or personnel in the Audio-Visual Department.

In a slide tape presentation, summative evaluation should occur before automation has begun, so that slides or script may be changed with relative ease. When developing an automated lesson for use on the Audio-Visual Response System, evaluation is simplified because of the System's ability to measure student response to objective questions. A pilot showing of the presentation, using a taped version of the script and manually advancing the slides permits evaluation while correction of content and slides is simplier. Evaluation of student comprehension was revealed by the percentage of correct responses to test items included midway and at the

end of the program. Criteria for success was established as eighty-five percent correct response with only one selection allowed. Items failing to achieve the eighty-five percent criterion were immediately investigated with the participants as to the reason for an incorrect response. Student feedback was focused on the need to change lesson content or lack of understanding of the question. Peers from the teaching team participated in the trial showing and the analysis of those items for which less than eighty-five percent chose the best response. In some instances, script revisions were indicated. Usually the problem stemmed from differing understandings of what the question was asking. Students and faculty offered suggestions to improve clarity and specificity. Over one hundred twenty first-year students, four nursing faculty, the college chaplain, and an employee from the Audio-Visual Department participated in the pilot demonstration and critique of the lesson.

RESULTS

Results of this practicum were the production of an automated lesson and a paper describing the process of producing a lesson.

Evaluation of the automated lesson indicated the following:

1. Type must be darkened with a felt pen unless a carbon ribbon can be used.
2. Eighty-five percent of the students can correctly respond to test items during and immediate following viewing of an automated lesson.
3. Items for which less than eighty-five percent of the students responded correctly were in each case phrased so that more than one interpretation of what the question asked was evidenced.
4. Development of a script with illustrative slides and questions required over one hundred hours of production time for a forty-five minute lesson.

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

The real value in developing an automated lesson was the instructor's gain in knowledge regarding the construction of objectives, sequencing of information, design of illustrative materials, and composition of test items. Time consumption limits the practicality of development of future lessons by the same instructor. Other instructors could benefit by experiencing personal growth in the ability to manipulate content to meet student needs and by increased skill in handling technical teaching aids.

While students enjoyed the automated lesson and were happy with the feedback mechanism included, almost all stated a preference for a more natural teacher lecture presentation. Nursing lectures often contain some, less sophisticated audio-visual adjuncts, and a testing or feedback mechanism, making these aspects less rewarding for nursing students than for students not previously accustomed to them. The automated lesson has an advantage over lecture in that a tape of the lecture and appropriate slides can be placed in the learning laboratory where students who need to can re-run a similar version manually. This type of set-up was also produced and made available for independent student use.

Additionally, many commercially prepared slide tape

programs are so excellently done, that with the addition of slides bearing test items, they may be readily adapted into effective automated lessons. This process would be far less time consuming and would also be a valuable experience in handling audio-visual materials in terms of teacher growth in instructional skills.

Once produced, an automated lesson requires the presence and control of the classroom teacher. Automation does not remove the need for the presence of the teacher, who assesses the student comprehension of the material according to the response system analysis and assures that content is clearly understood before continuing and at the end of the automated sequence. The lesson can be manually halted at any time for teacher clarification of information.

Despite the consumption of time, this was a rewarding and growth-producing experience. It is recommended that other faculty be encouraged to engage in the same process by provision of the following:

1. Release time or extra duty pay for the completion of an automated lesson.
2. An invitation for instruction in the operation of the AVR System 400, for interested faculty.
3. Offer of consultative services of an experienced designer of an automated lesson.
4. College recognition of faculty developing curricular innovations in a once yearly newsletter describing

faculty efforts and appropriate publicity in the local newspapers.

Motivation is more often intrinsically rather than extrinsically based. However, external reinforcement of internal willingness to develop innovations in instructional methods is certainly preferable to the often prevailing practice of ignoring the work of creative faculty, a custom which tends to extinguish the creative and innovative behavior.

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APPENDIX A

Lecture: The Need For Fluid (Water)

Assignment: Williams, Nutrition and Diet Therapy. pp.158-160
Fuerst, Wolff & Weitzel, Fundamentals of Nursing. pp.318-323

Objectives:

1. Given selected body systems, describe how fluid is essential to the function(s) of each.
2. Relate the movement of water to and from fluid compartments to the open system and homeostasis.
3. Select the percent of body weight due to body water in the infant, and the adult male and female.
4. Describe the implications of a decreasing percentage of body water with age as it applies to children and the elderly.
5. Describe the ways that water enters the body.
6. Describe the ways that water leaves the body.
7. When a person cannot eat food, state the effect on his need to take in fluids.
8. State the average daily obligatory water excretion through the kidneys.
9. Given sets of descriptions of patient situations, select those that indicate an increased need for fluid intake to achieve a healthful state of hydration.
10. Apply criteria for obtaining accurate Fluid Balance Records to measure patient intake and output. (Clinical objective)
11. Given descriptions of patient situations, specify which criteria is missing, causing possible distortion in the Fluid Balance Record.
12. Lists 3 criteria for obtaining accurate body weight when this measure is used to indicate water gains or losses.

Activity: Define the following vocabulary words:
Adaptation, Homeostasis, Hydration, Insensible Fluid Loss, Intake and Output, Open System, Tissue Turgor, Thirst Mechanism.

Clinical Lab Activity:
Measures I & O on assigned patient according to criteria.
Weighs a patient according to criteria.

Learning Lab Activity:
Study display for measuring fluid intake and output.

APPENDIX B

PROGRAM TITLE: THE NEED FOR FLUID

VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT
TITLE	-1				- INTRODUCTORY MUSIC
BLACK	-2	DIAGRAM MASLOW'S	+1		Today's discussion is on the need for water. + Water is a basic human need. - It is one of the
LIST OF NEEDS	-3	HIERARCHY			most primary of the physiological needs, and has priority second only to the need for oxygen, according to Maslow's Hierarchy of Needs.
					Look now at the need for water in the subsystems of the body. Every system of the body has a vital need for fluid. I've selected four systems to demonstrate how fluid is essential to each system in order for it to perform its functions. - +
G.I. TRACT	-4	BLACK	+2		Let's look at the role of water in the Gastrointestinal System. The purpose of the Gastro-intestinal System is to digest foods; that is to break foodstuffs down to particles small enough to be absorbed into the bloodstream. It does this by mechanical and chemical processes.
		G.I. FUNCTIONS	+3		+ Fluid is essential in order to dissolve food particles. Also, in order for the digestive enzymes to come into contact with the food particles, they need to float in a solution. In the Gastrointestinal Tract, then, fluid helps in the breakdown of food to absorbable particles.
RESP. TRACT	-5	BLACK	+4		- +
		MOISTENING	+5		Another body system in which water is essential is the Respiratory System. + Here one of the very
ALVEOLUS & CAP	-6				important functions of fluid is to moisten the air that one breathes. - Oxygen would not pass from the alveolus to the capillary, as well, if the air were not moistened. The fact that the air is moistened helps the oxygen molecules pass from the alveoli in the lungs into the capillaries,
RESP. TRACT	-7	CLEANSING	+6		or into the bloodstream. - +

PROGRAM TITLE: THE NEED FOR FLUID

VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
			Certainly, fluid is essential to help keep the respiratory tract clean. You all know that one produces large quantities of mucus each day. Those whose respiratory tracts are irritated by disease or smoking, produce even larger quantities of mucus, to help clean the respiratory tract. Some persons may cough and expectorate this mucus, which is brought up by the stimulation of getting out of bed in the morning, and breathing a little deeper. Most persons simply swallow this mucus containing dust, bacteria and other debris without conclous awareness of its presence.
			This cleaning function is also true of the upper respiratory tract....the nose and the pharynx. If one has a cold, there is increased mucus produced; and it cleanses the tract, washing out the pathogenic organisms. +
	LUBRICATING +7		Fluid also is necessary to prevent damage to the mucous membrane from drying. The mucous membranes must be kept moist or lubricated. If they dry, they will crack. They are very delicate tissues. They may may become inflammed or even infected, if allowed to dry.
			So, in the respiratory tract, fluid has a cleaning function, a moistening function, and a lubricant function. - +
INTACT SKIN -8	BLACK +8		A third body system in which water has a different and very essential role is the integumentary System, or the skin. + Here fluid is not so much for the skin itself as it is for the control of the whole organism's temperature. The fact that the skin has sweat glands in it, which can produce fluid for the purpose of evaporation, accounts for this function.
	SWEAT FUNCTION +9		

PROGRAM TITLE: THE NEED FOR FLUID

VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT
CIRC. SYS.	-9	BLACK	+10		Water in this system, then, is essential to life itself; in that it provides a cooling function, helping to regulate body temperature through the evaporation of perspiration. - +
		TRANSPORTATION	+11		The fourth example of a system in which fluid plays a vital role, is the Circulatory System. This system is, indeed, a fluid compartment of the body. + Here fluid is essential for transportation of nutrients and oxygen to the cells, and removing wastes including carbon dioxide, from the cells to places where they may be excreted....the kidneys and the lungs. Most of these substances are dissolved in the fluid portion of the blood. - +
CELL	-10	BLACK	+12		Keep in mind, that these are examples for you. There isn't a part of the body that can function without fluid. In fact all of the cells of the body are bathed in fluid. The environment of each part of the body is a fluid environment, and one could not survive it it were a dry environment.
		ADAPTATION	+13		The reason for this is that an essential mechanism for the body is Adaptation. + Adaptation is the
		HOMEOSTASIS	+14		ability to adjust. Adaptation is the process that allows for the state of Homeostasis. + Homeostasis is a state or condition which may vary, but which is relatively constant. The state of the body remains almost the same, or the same within limits, because of its ability to adjust or adapt to changes in the environment. +
		% BODY WT. FLUID	+15		This ability to adjust requires rapid exchange of information between body systems. This communication to and from every cell in the body, requires fluid, and exchange is made between fluid compartments. Because the body is largely fluid and can communicate rapidly to all its cells, it can adapt and therefore can maintain Homeostasis. - +
OPEN SYSTEM	-11	BLACK	+16		

PROGRAM TITLE: THE NEED FOR FLUID

VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
	CRITERIA OP. SYS +17		How does the need for fluid relate to the Open System? + As you know from your study of the criteria for an Open System, the fact that a fluid environment exists, making it possible for man to adapt to change, means that fluid is essential for the human being to meet the criteria of maintaing a steady state (Homeostasis), both within itself, and in relation to its environment.
			I would point out to you that the fluid intake of a healthy individual is equal to his fluid output....That fluid is one of the exchanges that man has with his environment.
			If body fluid losses were increased due to disease processes, causing vomiting, diarrhea, or excessive perspiration, for example; the body has a compensatory mechanism called the Thirst Mechanism. The Thirst Mechanism causes a person to drink enough fluid so that all fluid losses are replaced. The Thirst Mechanism, gives the body the cpacity to adapt, within limits, to stressors imposed upon it, either by its environment of from within itself. This is another criteria of the Open System in which water plays an essential role. - +
MALE % H_2O -12	BLACK +18		Water is a major constituent of the body; approximately sixty percent of the weight of the adult male is due to water. It is important to understand that there are tremendous variations between individual men, between men and women, and between adults and children. +
	♂ ♀ MEN, FEM INF VARIA +19		The individual difference among adult males is due mainly to the amount of body fat present, since fat is essentially water-free. Consequently, a fat individual has less fluid per pound of body weight than a thin individual. -
FEMALE % H_2O -13			

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VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
			Second, a woman's body contains a smaller percentage of fluid in relationship to her total weight, than does a man's. This is because a woman's body is composed of a larger amount of fat. Approximately fifty percent of the weight of the adult female is due to water. There are no differences in the percentage of body water between male and female until adolescence, when the female body increases in proportion of fat, and, at that time, decreases in the proportion of water.
INFANT % H_2O -14			The infant's body is approximately seventy-five percent water by weight. You should know that fluid balence is of greater importance in the infant, because so much of the baby's body is composed of water. The slightest fluid gain or loss is immediately evident. The younger the child, the more serious is any loss of the body fluids.
NEW BORN -15			
	ELDERLY +20		Realize that the percentage of body water per pound of weight decreases with age, providing a margin of safety for the child as he grows older. This percentage decreasewith age has implications for care of the elderly; who, because of their slowly diminishing body fluids, acquire skin changes. You recall that the skin of the aged is often dry and scaly, requiring less frequent bathing and applications of soothing lotions. NOTE THE DIFFERENCES IN THE SKIN.
WATER INTAKE -16 FLUIDS 1500 FOODS 1000 METAB. 330	BLACK +21		Lets describe briefly the three ways that water enters the body. You should know that the average daily intake of the adult human being is 2,500 cc. References vary on this, so use the figures I am giving you now. Of the fluid that the body takes in, approximately 1500cc. is from fluids....that is: water, milk, coffee, tea, juices or other beverages.
	ASSORTED BEVER. +22		
	ASSORTED FOODS +23		

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VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
			Almost 1000 cc. or a liter of the water one takes in is contained as fluid hidden in the food one eats. For example, meats contain a certain amount of water. Sometimes part of this may be seen as it leaves the food during the cooking process. Some foods such as crackers have very little water in them. Others such as meat, have more; and some such as fresh fruits or custards contain a great percentage of fluid by weight. It is easier to see the water in watermelon or a juicy pear, but remember, all food has some water in it, as a part of it. When food is broken down or digested, water is released, and the body can absorb and use this water.
	METABOLISM +24		Please note... Food provides approximately 1000cc of water a day.
			Then the body gets about 330cc. of water from metabolism. Now metabolism takes place, not in the gastrointestinal tract, but in the cells of the body. This process is the oxidation or burning of the end products of digestion in each and every cell of the body, resulting in energy
	BLACK +25		and waste products....one of which is water. This water can also be used by the body.
			REMEMBER, the body receives water in three different ways:
			Approximately 1500 cc in fluids.
			Approximately 1000 cc hidden in the foods we eat
			The appproximate 330 cc from the metabolism in the body cells accounts for any deficits in the first two sources, to achieve a total fluid intake of approximately 2500-2600 cc
SCALE I&O -17 2500 cc			a day for the adult human being.
			Now then, how does water leave the body? First of all the average daily output is approximately

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	KIDNEY 1500 cc +26		2500-2600 cc. + Certainly, the primary way that water leaves the body is through the kidneys.
SCALE I&O -18 1500 cc			About as much water leaves through the kidneys as is taken in each day in fluid. - Therefore,
			fluid intake that can be measured, should equal urine output. This is a good example of
			Homeostasis and the Open System. There is an equal or almost equal exchange with the
TOTAL OUTPUT -19 URINE 1500 PERSPIR 600 RESP 400 STOOL 100	BLACK +27		environment. - +
			Other lossses, according to their significance as fluid output mechanisms, are losses through
			perspiration, moisture in exhaled air, and losses in the stool. +
	INSENSIBLE FL LOSS +28 SWEAT GLAND		Most persons are not aware that significant quantities of fluid are lost each day through
			perspiration. During the day small amounts of perspiration are used to provide a little
			cooling by evaporation. This perspiration is not enough to make one feel wet or to see it
			roll down the face or arm. Because we are not aware of this almost constant process, we call
			this an insensible fluid loss. Insensible water loss occurs through perspiration, that one
	INSENSIBLE FL LOSS +29 RESP TRACT		doesn't feel and also through the exhaled air. +
			Remember that the inspired air is moistened to help oxygen pass into the capillaries. Well,
			when that air is exhaled, it is still moistened; and significant quantities of fluid are lost
			in this way. One isn't aware of losing water in this way, but a great deal can be lost,
			especially if the respirations are rapid and deep.....Nurses must associate excessive
			perspiration and hyperventilation with increased fluid loss and help in seeing that these
	INSENSIBLE FL LOSS +30 COLON		losses are adequately assessed! +

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VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
			The fourth way of losing fluid is normally very insignificant. This is through the large intestine or colon, excreted in the stool. Normally this would be a minimal amount of fluid loss of perhaps a hundred cc.'s. - +
DARK URINE -20 500 cc	BLACK +31		Let's talk about the average daily obligatory water excretion through the kidneys. It is true that for the body to rid itself of the wastes produced through metabolism, the kidneys must be able to excrete a certain amount of water, in which to dissolve these wastes. One cannot excrete wastes through the kidneys in lump or pellet form. These wastes must be dissolved in water. The amount of water that the kidneys must discharge each day in order to rid the body of the wastes created by metabolism is 500cc. If this were all that the body could allow to be excreted, because of intake deficits or other excess fluid losses, the urine would be a dark amber color and very concentrated. + If more urine can be produced, because water is available and there is more than is necessary for other body functions, then the urine will be a light yellow or straw colored, as the same amount of waste material is dissolved in a larger amount of water. - +
	LIGHT URINE +32 2000 cc		
BLACK -21	BLACK +33		Now I want to pause to test your grasp of the material covered so far. As each of the following questions is pictured on the screen, and when the wall signals indicate that you may respond, select the best answer on your desk set. You may only make one selection for each question.

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VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT	
QUESTION	-22			- 15 sec	In which of the following ways does water enter the body? A. Through Fluids B. Through Vitamins C. Through Foods D. Through Metabolism E. Through Condiments	
		OPTIONS	+34	+ 45 sec		1. A, B, C 2. B, D, E 3. C, D, E 4. A, B, E 5. A, C, D
		ANSWER	+35	+ 15 sec		CORRECT RESPONSE 5. A, C, D (Through Fluids, Foods and Metabolism)
QUESTION	-23	BLACK	+36	- + 45 sec	Which of the following ways that water leaves the body is least significant in body fluid losses? 1. Urine 2. Perspiration 3. Respiration 4. Formed stool	
		ANSWER	+37	+ 15 sec		CORRECT RESPONSE 4. Formed Stool
QUESTION	-24	OPTION	+38	- + 60 sec	Which of the following are functions of water in the Respiratory System? A. Cleansing B. Cooling C. Dissolving D. Lubricating E. Moistening F. Transporting	

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VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
			1. A, B, C 2. D, E, F 3. B, C, F 4. C, D, F 5. A, D, E
	ANSWER +39	15 sec +	CORRECT RESPONSE 5. A, D, E (Cleansing, Lubricating, Moistening)
QUESTION -25	BLACK +40	- + 45 sec	Dry skin often seen in elderly persons is a result of which of the following physiological changes? 1. Increase in fat cells 2. Decrease in fat cells 3. Increase in body water 4. Decrease in body water 5. None of the above
	ANSWER +41	+ 15 sec	CORRECT RESPONSE 4. Decrease in body water
QUESTION -26	BLACK +42	- + 45 sec	When a person is not allowed or is unable to eat solid food, his need for water in fluid form is _____. 1. Decreased 2. Increased 3. Unchanged
	ANSWER +43	+ 15 sec	CORRECT RESPONSE 2. Increased
QUESTION -27	BLACK +44	- + 45 sec	The average daily required, minimum urine output is: 1. 150 cc 2. 250 cc 3. 400 cc 4. 500 cc 5. 700 cc
	ANSWER +45	+ 15 sec	CORRECT RESPONSE 4. 500 cc

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VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT
QUESTION	-28	BLACK	+46	+ 45 sec	Which of the following is the overall characteristic of body fluid which assures homeostasis through the process of adaptation? 1. Temperature regulation through cooling action 2. Protection from pathogens through cleansing action 3. Breakdown of foodstuffs through dissolving action 4. Provides rapid exchange of information between body systems 5. Adequate blood oxygen through moistening function
		ANSWER	+47	- 15 sec	CORRECT RESPONSE 4. Provides rapid exchange of information between body systems
NUR ASSESS	-29	BLACK	+48	- +	

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VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
ASSESS. FL BAL QUES 1-4 -30			Now then, how does a nurse assess a patient's state of Fluid Balance or Hydration. The nurse looks for known conditions that usually result in a water balance problem. The following questions help the nurse make this assessment: 1. Is the patient drinking at least 1500 cc. of fluid a day? 2. Is intake of food greatly decreased? 3. Is he voiding at least once every eight hour shift? 4. Is his urine scanty and dark amber in color? +
	ASSESS. FL BAL QUES 5-9 +49		5. Is his skin dry and/or lose? 6. Is patient's temperature elevated? 7. Is he persiring excessively? 8. Are there any other unusual fluid loses?...such as diarrhea, vomiting or wound drainage. 9. Has body weight varied more than two pounds when measured daily? If the answers to these questions produce doubts about the patient's state of hydration, the situation should be discussed with the Team Leader, and accurate measurement of intake and output started at once. - +
I&O INDEP. NUR FUNC ST. NUR ACT -31	BLACK +50		Measurement of Intake and Output and maintaining an accurate Fluid Balance Record are an independent Nursing Functions. The assessment of fluid needs described, would fall into the category of Standardized Nursing Care.....As would measurement of intake and output, if it is done so that the following criteria are met:
CRITERIA I&O 1-4 -32			

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VISUALS LEFT (A)	VISUALS RIGHT (B)	CODING	CONTENT
			1. Communication (written and verbal) among staff members is necessary, so that ALL members know which patients are on intake and output measurement, usually called I and O.
			2. Communication with patients and visitors is necessary so that they know that all fluid gains and losses are measured.
			3. Fluids are actually measured in standardized containers. For example, a graduate might be used to measure all fluid losses. One certainly does not use the measures on the side of drainage bags as measuring devices, since each will vary.
	CRITERIA I&O 5-9 +51		4. Fluid taken in as ice chips is recorded. A 200 cc. glass of ice chips is equivalent to 100 cc. of water.
			5. All solid foods are recorded. Recall that solid foods also contain water and usually account for forty percent of the daily fluid intake.
			6. Record loss of water by perspiration. Describe perspiration as excessive, moderate or mild.
			7. Estimate fluid loss from involuntary loss of stool or urine or from wound drainage.
			8. Measure fluid used as irrigating solutions. Record excess return flow as output.
			9. Include as measured intake fluid used to swallow medications. This fluid intake when measured in one study, was found to range from 250 to 470 cc. a day.
PT. ON SCALE -33	CRITERIA FOR WEIGHING +52		As a further aid in assessing water gain or loss, the nurse may independently (providing activity orders permit) weigh the patient. For this to be an accurate assessment, the patient should be weighed daily at the same time, on the same scale and in clothing of the same approximate weight. Usually daily weights are done after the patient empties his

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VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT
SUMMARY	-34	SUMMARY DETAIL	+53		bladder, at an early morning hour, before breakfast is served. - +
					TO SUMMARIZE: This presentation has meant to teach the great importance of water to man in performing his bodily functions. It also includes differences in importance or distribution of water according to age, sex or individual variation, since these differences have implications regarding nursing care. How water enters and leaves the body and some of its functions in the body have been given, to help you understand man as an Open System and the process of Adaptation to achieve Homeostasis. Finally, you have been given the specific nursing responsibilities in assessing patient's fluid needs; and the initial standardized nursing actions (that is, measurement of Intake and Output and Daily Weight) as methods of determining an individual's exact Fluid Balance State, and current water needs. - +
BLACK	-35	BLACK	+54		Please respond to the following series of questions as you have the previous series, to measure your comprehension of the nurse's role in assessing patient fluid needs.

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VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT	
PT. SIT.	-36			30 sec	PATIENT SITUATION An elderly man is admitted during a Flu epidemic. He states thgt for 2 days he has been too nauseated to eat, and has been sweating a lot. TRP-102 F.-90-20. Mouth appears dry. Skin is loose and not firm to touch. Urine specimum for admission urine is dark amber and scanty.	
		QUESTION	+55	40 sec		Which of the following nursing actions should you take to assess fluid needs? 1. Blood hematocrit and urine specific gravity 2. Special skin care with soothing lotion 3. High Fowlers position to prevent vomiting 4. Tepid sponges to reduce fever 5. Measuring I&O and daily weight
ANSWER	-37			15 sec	CORRECT RESPONSE 5. Measuring I&O and daily weight	
PT. SIT.	-38	QUESTION	+56	60 sec	PATIENT SITUATION see above	How many indications of possible fluid balance or hydration needs are included in this patient description? 1. Two indications of needs 2. Three indications of needs 3. Four indications of needs 4. Five indications of needs 5. Six indications of needs
ANSWER	-39			15 sec	CORRECT RESPONSE 5. Six indications of needs	
PT. SIT.	-40	QUESTION	+57	45 sec	PATIENT SITUATION see above	Question on next page

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VISUALS LEFT (A)		VISUALS RIGHT (B)		CODING	CONTENT
					Since this patient was admitted at 11 A.M. and was weighed on admission, the best time to weigh him on succeeding days would be: 1. Six A.M. 2. Before breakfast 3. At the time of his bath 4. Eleven A.M. 5. Any time during the day shift
ANSWER	-41			- 15 sec	CORRECT RESPONSE 4. 11 A.M.
PT. SIT.	-42	QUESTION	+58	- + 20 sec	PATIENT SITUATION see above
					This patient is taking medications with sips of coke. He can also tolerate small quantities of ice chips. This and jello are all that he is able to retain. If these things were <u>not</u> measured, would it distort the fluid balance record? 1. yes 2. no
ANSWER	-43			- 10 sec	CORRECT RESPONSE 1. yes
THE END	-44	BLACK	+59		THE END..... MUSIC

APPENDIX C