

Why Do We Lecture?

P A P E R # 2 • F E B R U A R Y 1 9 9 6

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Introduction

“What I hear, I forget;
What I see, I remember;
What I do, I understand.”

– *Old Chinese proverb*

More recently this truism has been quantified by Dale (1969) as shown in **Table 1**. Given that interactive teaching, where both the instructor and student are actively (and equally) involved in the learning process, is overwhelmingly more successful than lecturing, one wonders why physician/teachers devote so much time and energy to preparing and giving the “perfect lecture.” Perhaps it’s because most medical faculty have no formal teacher training. As a consequence, many of us—myself included for many years—spend most of our academic careers wondering why students don’t pay more attention to our profound utterances if they want to have more knowledge. Or why behind our backs they often refer to us as pedantic bores.

As a method for providing information and knowledge, lecturing has dominated formal education over the centuries. It has been used for large groups to convey a lot of content in a short time, keep the

group together on the same points and control time. Perhaps its biggest advantage is that, in the hands of an enthusiastic teacher steeped in the subject, it can be an effective vehicle to impart and infuse learners with a spirit and vision and love for the subject. Careful observation, however, shows that lecturing frequently is without accompanying discussion, questioning or immediate practice and, even when followed by testing, is one-way communication and a poor learning method.

Similarly, one wonders why so many physician/teachers are tyrants in the operating theater, creating high-stress situations by using fear in the mistaken belief that it is an effective learning tool. Clearly, we must be wearing blinders since all around us effective learning is taking place without stress or fear being used. Is learning surgical procedures so much more difficult than being a skilled tennis player? I think not, because I learned both. Even reconstructive tubal microsurgery requires no finer skills than hitting a topspin backhand. Moreover, learning to hit that perfect backhand stroke, patiently guided by a coach who continually gave me constructive feedback, reassurance and support, was infinitely more pleasant than being terrified as a resident doctor that I would make a mistake in the OT when operating with the “great professor.”

Table 1—Learning Recall Related to Type of Presentation

Type of Presentation	Ability to Recall	
	after 3 hours	after 3 days
Verbal (one-way) lecture	25%	10–20%
Written (reading)	72%	10%
Visual and verbal (illustrated lecture)	80%	65%
Participatory (role plays, case studies, practice)	90%	70%

Adapted from: Dale 1969.

Teaching Methods

Medical schools around the world traditionally have avoided examining the way faculty members teach and why their prevailing practices are faulty. Few institutions provide substantial, ongoing teacher training to any faculty members. Those that do make it clear that teaching is secondary to research and a host of other activities. Far too often faculty lecture to their students, believing that their primary role as teachers is to “cover the subject.” This notion of coverage suggests that a certain amount of content must be presented to students in the allotted time. Students, kept in a passive role by the lecture format, are expected to absorb the content for later use. But since they receive little direct instruction in how to use the content for higher order cognitive tasks, such as problem solving, they retain little information. Furthermore, even in classes designed for discussion, teachers do most of the talking.

If medical education (and this applies to higher education in general) is to change, faculty members must be genuinely interested in teaching and they must be trained in interactive methods. Medical schools must encourage and support faculty teachers in adopting teaching practices that actively involve students on a daily basis. According to Bejaj (1989), to accomplish this will require development of a new approach to undergraduate medical education in which learning activities would be directed towards:

- shifting emphasis from use of teacher-oriented to learner-oriented methods, including self-paced learning and assessment (written or using an audio-, video- or computer-based format);
- changing from narrow, discipline-oriented teaching to a problem-solving approach;

- moving from lecture-oriented (one-way) teaching to experiential, interactive learning; and
- changing the medical teachers' role from the lecturer who transfers a defined body of knowledge to that of a facilitator or coach of student learning.

Assessment of Learning

Before any meaningful change in teaching can take place, however, medical school faculty must fully realize the importance of objectively measuring student performance. In the absence of carefully designed assessment instruments or any other verifiable definition of student proficiency, any claims of effectiveness amount to mere assertion. For example, at a recent seminar on distance learning, the chair of the academic standards committee of a prominent health professional school was asked the question, “How do you assess the quality of your teaching?” Without hesitation he responded, “We don't have to because our faculty is the best.” In the coming years, academic excellence will be defined increasingly in measurable, quantifiable terms, not just by reputation of the school or a high tuition.

At present, medical schools throughout the world still have no comprehensive means of assessing students other than through grades, which are notoriously poor indicators of student ability. Grades also constitute a built-in conflict of interest because the person who does the teaching also assigns the grades. Moreover, even within academic departments, faculty seldom have tried to create uniform grading standards for the same course. As a consequence, faculty grading often varies widely. To correct these problems, medical school faculty must begin to specify in

behavioral terms what it is they expect their graduates to know and be able to do and how well they expect them to do it. Without such standards, it is not possible to develop reliable and valid assessment measures.

Mastery Learning Approach¹

For the past several years JHPIEGO has been developing a more effective approach to both classroom (didactic) and clinical training. It is based on the assumption that all students at the undergraduate and graduate levels can master the required knowledge, attitudes and skills provided sufficient time and appropriate learning methods are used. This approach focuses on learning by seeing and doing rather than by preaching and scolding. Moreover, it is an approach with which medical faculty can be comfortable and which does not require learning to become an “educator” or mastering educational jargon (McIntosh 1992).

The goal of mastery learning is that 100% of those being trained will learn the essential knowledge and skills on which the training is based. While some students are able to learn new knowledge or a new skill immediately, others may require additional time or alternative learning methods before they are able to demonstrate mastery of the knowledge or skill. Not only do people vary in their abilities to absorb new material, but individuals learn best in different ways—through written, verbal or visual means. Effective learning strategies take these differences into account and use a variety of learning methods.

The mastery learning approach enables the student to have a self-directed learning experience. This is achieved by having the faculty teacher serve as facilitator and by changing the concept of testing and how test results are used. In courses that use traditional testing methods, teachers administer pre- and post-tests to document an increase in the students’ knowledge, often without regard to how this change affects job performance. The philosophy underlying the mastery learning approach, however, is quite different. It is based on continual assessment of participant learning. To be successful, it is essential that the instructor regularly inform students of their progress in learning new information and skills and not allow this to remain the instructor’s secret.

With the mastery learning approach, a brief precourse questionnaire is used to determine what the students, individually and as a group, know about the course content. This allows the faculty trainer to identify topics which may need additional emphasis, or in many cases, require less classroom time during the course. Providing the results of the precourse assessment to students enables them to focus on their individual learning needs. Subsequent testing is designed to assess the students’ progress in learning new information. Again, results of this assessment are reviewed with students.

With the mastery learning approach, assessment is:

- **Competency-based**, which means the assessment is keyed to the course objectives and emphasizes acquiring the essential knowledge and attitudinal concepts needed to perform a job, not just acquiring new knowledge.

¹ Adapted from: Sullivan R et al. 1995. *Clinical Training Skills for Reproductive Health Professionals*. JHPIEGO Corporation: Baltimore, Maryland.

- **Dynamic**, because it enables faculty to provide their students with continual feedback on how successful they are in meeting the course objectives. (Teachers using pre- and post-tests often do not review the correct answers with the participants. As a consequence, students may leave the course not knowing important information.)
- **Less stressful**, because from the outset students, both individually and as a group, know what they are expected to learn, where to find the information and have ample opportunity to discuss it with the faculty trainers.

Key Features

The key features of the mastery learning approach are that it:

- is based on social learning theory and behavior modification (modeling),
- incorporates adult learning principles,
- uses what we have come to call the “humanistic” training method, and
- is competency-based.

Social Learning Theory

What does social learning theory tell us that will help us become better teachers and surgeons? In its most basic terms, it states something we all know but actively, it seems, try hard to forget—that modeling (imitating) the behavior of others is the way we all learn from day one. Recently, I spent a pleasant 10 minutes watching my 5-year-old daughter “teach” a friend how to ride a bicycle. Verbal communication was limited to laughter, squeals of delight when her friend did the right thing and the frequently repeated phrases, “Let me show you” or “It’s easy.” There

were no lectures on centrifugal force, and how it keeps rotating bodies such as a bicycle with its spinning wheels from changing its vertical position (i.e., falling over). In no time at all, however, both were equally skilled in riding the bicycle, and their attention then turned to sharing one bicycle—an activity with which 5-year-olds (and some adults) still have great difficulty.

In 1981 Zemke and Zemke stated this social learning theory more formally, “...when conditions are right, we learn most rapidly and effectively from [exposure to] someone [correctly or proficiently] performing the desired behavior.” Whether it’s surgery or tennis, seeing and working with someone who performs the skill proficiently is worth a thousand words. But what does “performs the skill proficiently” mean? In the USA we have a saying about someone who is a good surgeon—“S/he has good hands.” What is meant by this is that the surgeon seems to operate effortlessly, smoothly and with every move so purposeful that s/he appears to be operating very fast. Moreover, because each move is well-planned, assisting a good surgeon is easy for both the assistant and the scrub nurse.

Analyzing how the skilled surgeon, the one with good hands, differs from the surgeon who struggles through each case usually reveals that the former:

- has a standard, well thought out method for performing the procedure, changing her/his approach only when the anatomy or pathology dictates; and
- has practiced (and refined) this standard approach repeatedly until s/he is unconsciously competent.

This then is a working definition of “performs the skill proficiently.”

For faculty members (or surgeons with “good hands”) who aspire to be good clinical trainers, the critical steps involve learning how to transfer their knowledge and skills effectively. To do this requires learning how to facilitate three processes:

- creating a comfortable atmosphere for learning;
- helping the student remember the key steps in the desired behavior; and
- translating the desired behavior into skilled performance.

Being able to facilitate these processes will allow the student to go from being consciously incompetent to becoming unconsciously competent (Howell 1982). To successfully do this, the instructor, now trainer, needs to be familiar with how adults learn—the second component of our approach to learning.

Key Characteristics of Adult Learners

Adult learners—and medical students qualify as such—desire that learning be:

- relevant;
- task-oriented;
- participatory (two-way communication);
- friendly (controlled stress, positive feedback);
- varied (demonstrations, case-studies, role play; not just lectures); and
- built on past experience.

These characteristics are based on the following eight principles of adult learning (Sullivan et al 1995):

- Learning is most productive when the student is ready to learn. Although motivation is internal, it is up to the clinical trainer to create a climate that will nurture motivation.
- Learning is most effective when it builds on what the student already knows or has experienced.
- Learning is most effective when students are aware of what they need to learn.
- Learning is made easier by using a variety of training methods and techniques.
- Opportunities to practice skills initially in controlled or simulated situations (e.g., through role play or use of anatomic models) are essential for skill acquisition and for development of skill competency.
- Repetition is necessary to become competent or proficient in a skill.
- The more realistic the learning situation, the more effective the learning.
- To be effective, feedback should be immediate, positive and nonjudgmental.

As mentioned earlier, the teaching model with which most health professionals are familiar is the classroom instructor lecturing to a group of students who anxiously take notes so that they can pass a written examination. This approach to teaching, used by a skilled instructor, can be effective in providing basic knowledge. It is, however, a very poor way of imparting clinical skills such as inserting an IUD, strengthening problem-solving skills or changing attitudes towards clinical practice. For example, as shown in **Table 2**, only when combined with demonstration, practice, feedback and especially coaching, is there significant:

Table 2—Transfer of Learning

Training Components	Skills Attained	Transfer to Job
Theory	10–20%	5–10%
+		
Demonstration	30–35%	5–10%
+		
Practice	60–70%	5–10%
+		
Feedback	70–80%	10–20%
+		
Coaching	80–90%	80–90%

Adapted from: Joyce and Showers 1981.

- attainment of the desired skills, and
- successful transfer of the skills to on-the-job performance (Joyce and Showers 1981).

Humanistic Training Method

The third component of our learning approach involves using anatomic models and other learning aids to simulate a real-life situation. Where a clinical skill, such as inserting an IUD or performing a lumbar puncture, is involved, this component has come to be called the humanistic training method (McIntosh 1992).

Medical faculty have used models for demonstration purposes for many years, but until recently most medical teachers have been loath to use models for helping students learn (or practice) the desired behavior or skill. This reluctance is partly due to the lack of good models which closely mimic the human body, or of other learning aids such as interactive computer-based programs, until the last few years. For most physicians, however, the reason is more basic—one that is deeply imbedded in the mistaken

belief that medical or surgical procedures can be learned only with a patient. Everywhere around us, however, are examples which contradict this belief—situations where use of simulators is the norm, not the exception. For example, for many years commercial airlines have required that pilots first learn to fly 747s and airbuses in a flight simulator.

The use of more humane teaching methods is an important factor in improving the quality of skills training (Delker 1990; Norton 1987). By working with models (simulators), students can learn (and repeatedly practice) the steps (and sequence) required to perform a medical procedure or activity safely. For example, practicing IUD insertion on a pelvic model prior to performing the procedure with a client has many advantages, such as minimizing the risk of making a learning mistake on a client and permitting the student to learn the procedure in a much more relaxed environment. Other important advantages of learning with models are that their use:

Table 3—Levels of Performance

Skill Acquisition	Knows the steps and their sequence (if necessary) to perform the required skill or activity but needs assistance
Skill Competency	Knows the steps and their sequence (if necessary) and can perform the required skill or activity
Skill Proficiency	Knows the steps and their sequence (if necessary) and efficiently performs the required skill or activity

- facilitates skill acquisition and competency (see **Table 3**);
- decreases the number of cases needed to achieve skill competency;
- permits clinical skills training to be done in the classroom and at times when the clinic may not be open;
- enables training to be done at sites where caseloads are low; and
- shortens basic training time, thereby making it less costly.

In using the humanistic training method in IUD training, for example, two learning activities should occur before the student attempts to insert an IUD. First, the essential skills and client interactions should be demonstrated by the instructor/trainer several times with the model and other teaching aids (e.g., videotape or slide set). Second, the essential skills and client interactions should be practiced repeatedly by the student using the pelvic model and actual instruments. This should be done under supervision and in a setting which closely simulates the real situation. Only when skill competency and some degree of skill proficiency have been demonstrated should the student have her/his first contact with a client (McIntosh 1992).

Competency-Based Training

The fourth and final feature of the mastery learning approach is that it is competency-based. The goal of clinical training is to help physicians perform their clinical duties competently. No matter how effective training is in conveying information, influencing attitudes and judgment, or stimulating thought, it will have failed if medical graduates are unable to perform the tasks assigned to them (McIntosh 1992).

Competency-based training (CBT) is distinctly different from traditional educational processes (Sullivan 1995). CBT is learning by seeing and doing. More traditional forms of instruction, on the other hand, attempt to educate the student by providing a broad array of knowledge from which s/he later can select what is needed, according to the given situation. Unlike the traditional model, CBT provides students with those competencies vital to the successful performance of their jobs. While traditional forms of training place great value on evaluation of what information the student has learned, CBT emphasizes evaluation of how the student performs (i.e., a combination of knowledge, attitudes and, most importantly, skills).

To successfully accomplish CBT, the clinical skill or activity to be taught is first broken down into its essential steps or units. Each step is then analyzed to

determine the safest and most efficient way to perform and learn it. This process is called standardization. Once the procedure has been standardized, competency-based assessment instruments (learning guides and checklists) can be developed for use in training and evaluating trainee performance.

The final steps in the CBT process are:

- identifying medical faculty who are experts in performing the procedure or activity,
- helping them to learn to proficiently perform the procedure using the standard approach,
- showing them how to transfer their expert knowledge and skills effectively to students, and
- assisting them to learn how to use the CBT learning guides and checklists to assess student performance.

Application and Evaluation

To date, this learning approach has been applied to a number of preservice (undergraduate) and inservice (postgraduate) training situations. For example, in a recent study conducted in Thailand, a standard (6-week) IUD training course for nurses was compared to a 2-week, competency-based course using a specially designed pelvic model (Ajello et al 1991). This model closely simulates the female pelvis and can be used to demonstrate and learn the skills needed to:

- do a complete pelvic exam (speculum, bimanual and rectovaginal),
- obtain vaginal and/or cervical specimens for microscopic examination, and
- insert and remove IUDs.

In this study 300 nurses selected for IUD training were divided into two groups of 150 each—a control group who attended the standard 6-week course and a study group who took the 2-week CBT course. The trainers for the study group were instructed in CBT techniques while the trainers for the control group continued to use their traditional training approach. In addition, a separate group of instructors was trained to serve as external examiners in order to independently assess the performance of both groups. The evaluators used written, competency-based checklists which had been developed and field-tested prior to the study. These checklists covered all aspects of IUD service delivery including initial and method-specific client counseling, client screening for STDs, medical assessment, IUD insertion/ removal and followup care. Limited data also were collected which documented client, trainee and trainer satisfaction and compared direct costs.

The results of this study are summarized in the following tables (Tables 4–6). As shown in Table 4, on average, trainees in the study group were judged to be competent after 1.6 cases whereas the control group required significantly more cases—6.5.

Type of Training Course	CASES (Average)
Study Group: Competency-based (2 weeks)	1.6
Control Group: Standard (6 weeks)	6.5
t value = 18.10 (p < .001)	

Moreover, 99% of the study group trainees were judged to be competent after the fifth client, compared to only 29% in the control group (**Table 5**). Most importantly, 10% of the trainees in the control group never achieved competence, even after the sixteenth case (**Table 5**).

Client Number	Study Group	Control Group
1st	70%	0%
3rd	97%	17%
5th	99%	29%
8th	—	61%
16th	—	90%

Finally, direct costs for the 2-week CBT course were only 54% of those for the standard (6-week) course (**Table 6**). (Direct costs for the CBT course would have been even lower if the cost of the models, about \$240 each, could have been dispersed among more trainees.)

Training Approach	Per Participant
Study Group:	
Competency-based (2 weeks)	\$383
Control Group:	
Standard (6 weeks)	\$714

The lessons learned from this comparative study are as follows:

- Both the standard (6-week) and competency-based (2-week) IUD training courses helped participants learn the required clinical skills.
- The CBT course:
 - led to more rapid achievement of skill competency,
 - increased the proportion of trainees achieving skill competency,
 - provided a humanistic approach to training which minimized risk to the client,
 - diminished training dependency on large client-acceptor caseloads, and
 - was significantly less costly.
- Competency must be assigned on an individual basis (i.e., there is no magic number of clinical cases which automatically makes a participant competent).
- Some trainees may never learn the skills for providing IUD services **unless** the training is competency-based.
- Client satisfaction is much higher when IUD training uses humanistic methods.
- When the training is based on adult learning principles and is competency-based:
 - Trainee and trainer satisfaction is higher (less stress with better two-way communication).
 - The focus of the trainer shifts from giving a “great lecture” or designing the “perfect course” to improving trainee performance.

Despite the positive results of this study, the question often asked is “Does training really make a difference?” In this case, the answer is a resounding “yes.” Not only did the new method improve the quality of training and shorten training time, but it also led to the Government of Thailand changing the way IUD training is conducted. As a consequence, nearly three times as many nurses can now be trained for about the same cost as before this study was conducted.

Summary

The goal of the mastery learning approach is to equip medical students and interns with the knowledge and skills needed to carry out their clinical duties more safely and efficiently. Since 1990, JHPIEGO has introduced this learning approach into selected host country medical schools. To date, it has been well received by both faculty and students wherever it has been tried. In addition, when this approach is used, students learn the essential knowledge and skills in less time, at less cost and with fewer patients needed for training purposes.

The mastery learning approach developed by JHPIEGO is based on four key features. **First**, it involves use of behavior modification (modeling) to facilitate learning a standardized way of performing the skill or activity. **Second**, it incorporates use of adult learning principles, which means it is interactive, relevant and practical. Moreover, it requires that the faculty teacher facilitate the learning experience rather than serve in the more traditional role of an instructor. **Third**, where possible, it relies heavily on the use of models and other teaching aids (i.e., it is humanistic) to enable students to gain confidence in performing the assigned task or procedure before working with patients. **Fourth**, it is competency-based. This means that the training focuses on how well the student

performs rather than how much has been learned. Finally, this learning approach stresses the importance of the cost-effective use of limited resources and the application of relevant educational technologies.

Developing and implementing a learning approach similar to the one described in this paper requires a major commitment on the part of medical faculty to change dramatically the way they view their roles and teaching responsibilities. To introduce the mastery learning approach requires that faculty instructors function as facilitators, trainers and coaches and, most importantly, that they view their students as partners in the learning process.

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