UCSD Advances in Medical Education Program

Passive to Active Learning
2005

Course Directors:

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Passive to Active Learning

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Dear Colleague,

Thank you for choosing to participate in the Advances in Medical Education program, sponsored by University of California San Diego School of Medicine, Office of Continuing Medical Education. Enclosed are documents providing background information for this program. Please study them prior to attending the program so you will be prepared to participate.

The power point lecture is the ultimate example of passive education. Passive education is an ineffective teaching technique, a fact well known by your kindergarten teacher, medical school students and residents, and many CME program attendees. This fact is well documented in the medical literature. In addition, most of us know this through our own anecdotal experiences, both as a student and as a teacher. A more effective teaching paradigm is active learning.

In this course, you will learn the principles of adult education, interactive design theory, game theory and active learning. The course itself will be interactive, employing the principles and tools of active learning. By the end of this program, you will have a greater awareness of the problems of passive learning and the advantages of active learning. Using the information learned in this program, you will be able to incorporate the principles of adult learning theory and active learning, and determine where they apply to medical education.

Following the program, you will be offered an opportunity to participate in an outcomes study in which you will be asked to further review syllabus and program materials to develop plans to incorporate interactive design, game theory and active learning into future medical education programs.

This is a major cultural shift, but one that we must undertake. There will be no lecture, no power point, and no sleeping in class. You, the student, will be guided on a tour of active learning tools. Come prepared so you can participate and enjoy the trip.

Sincerely,

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UCSD Advances in Medical Education Program

Course Directors: Terence M. Davidson, Francis B. Gabbai

Course Description

We will introduce and discuss current knowledge in adult education, interactive design theory, game theory and active learning with intention that the participants will explore and incorporate these educational principles into future medical education at UCSD. The course begins with a mailing of syllabus materials for participants to read prior to attendance. Selected participants will be asked to focus on certain areas of the material and to present their findings and thoughts at the program. The course itself will be interactive, employing the principles and tools of active learning. Following the program, participants will be offered an opportunity to participate in an outcomes study in which they will be asked to further review syllabus and program materials to develop plans to incorporate adult education, interactive design, game theory and active learning into future medical education programs.

Objectives

By the end of this program, the participants will have a greater awareness of the problems of passive learning and the advantages of active learning. Using the information learned at this program, the participants will be able to incorporate the principles of adult learning theory, interactive design, game theory, and active learning, and determine where they do and do not apply to medical education. They will be able to implement the learned tools and techniques of advanced medical education at UCSD.

UCSD Advances in Medical Education Program
Passive to Active Learning

7:30 – 8:00 am: Continental Breakfast

8:00 – 8:20 am: Introduction

1. Think - Pair - Share: Past Lecture Recall
2. Write your goals for the program.
3. Think – Pair – Share: Define Passive and Active Learning
4. Group Discussions: Effects of Continuing Medical Education by Bloom
5. Questions via Audience Response System

8:20 – 8:45 am: Adult Learning Theory

1. Think – Pair – Share: What is it? What are the principles?
2. Group Discussions: Do we believe it?
3. Debate: Do doctors know their deficiencies? Do they seek CME to rectify areas of weakness?

8:45 – 9:45 am: Active Learning

1. Group Discussions: List Techniques
2. Jeopardy – GME vs. CME
3. Evaluation System at UCSD – Mark Kritchevsky

9:45 – 10:00 am: Conclusion

1. Group Discussions: Were our goals accomplished?
2. Audience Response System: What changes do we plan to make?

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Effects of continuing medical education on improving physician clinical care and patient health: A review of systematic reviews

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University of Pennsylvania

Objectives: The objective of physician continuing medical education (CME) is to help them keep abreast of advances in patient care, to accept new more-beneficial care, and discontinue use of existing lower-benefit diagnostic and therapeutic interventions. The goal of this review was to examine effectiveness of current CME tools and techniques in changing physician clinical practices and improving patient health outcomes.
Methods: Results of published systematic reviews were examined to determine the spectrum from most- to least-effective CME techniques. We searched multiple databases, from 1 January 1984 to 30 October 2004, for English-language, peer-reviewed meta-analyses and other systematic reviews of CME programs that alter physician behavior and/or patient outcomes.
Results: Twenty-six reviews met inclusion criteria, that is, were either formal meta-analyses or other systematic reviews. Interactive techniques (audit/feedback, academic detailing/outreach, and reminders) are the most effective at simultaneously changing physician care and patient outcomes. Clinical practice guidelines and opinion leaders are less effective. Didactic presentations and distributing printed information only have little or no beneficial effect in changing physician practice.
Conclusions: Even though the most-effective CME techniques have been proven, use of least-effective ones predominates. Such use of ineffective CME likely reduces patient care quality and raises costs for all, the worst of both worlds.

Keywords: Medical education, Clinical practice, Population health, Physician education, Continuing medical education, Evidence-based medicine

Educators, researchers, and policy-makers have analyzed over the past 5 decades appropriate use of medical care. Most research previously focused on overuse (18;27;30) but now includes underuse, misadventure, medical errors, and malpractice (11;20;26). Overuse leads to preventable increased risk of iatrogenic disease and wasted resources. Underuse, including poor patient adherence, has adverse health and quality of life effects and may lead to greater long-term expenditures than would have been needed.

Inappropriate health services use begs the question of why this occurs, that is, the disparity between available information on effective care and use in daily medical practice. For many diseases and treatments, randomized control trials (RCTs), meta-analyses, and widely distributed clinical practice guidelines derived from this evidence define best care and expected benefits.

One hypothesis for inappropriate medical service use where scientific evidence supports clinical efficacy is use of relatively ineffective continuing medical education (CME) tools and techniques. CME are activities to improve physician knowledge, attitudes, and skills, to keep them current with the latest advances that improve patient-care processes

and outcomes, to help them accept or reject new practices, and convince them to discontinue use of existing care of lesser effectiveness. CME can be face-to-face or at a distance, and educators can be human or devices such as computers. Patient treatment adherence is equally problematic, and ways to improve it are known also but will not be discussed further (22).

The objective of this review is to present systematic research results that previously quantified effects, mainly by formal meta-analysis, of specified CME techniques on physician-care processes and improvements of patient health outcomes. Previous analyses and reviews have discussed effects of individual CME techniques, but almost none reviewed all techniques and compared estimates of benefits derived by meta-analyses.

METHODS

We searched Medical Literature Analysis and Retrieval System On-Line, Database of Abstracts of Reviews of Effects, Cochrane Collaborative, Cinahl, Excerpta Medica Database, Psychinfo, Canadian Medical Association Infobase, National Guidelines Clearinghouse, evidence-based medicine reviews, American College of Physicians Journal Club, HealthSTAR, and related databases from 1 January 1984 through 30 October 2004, using multiple search terms for efficacious CME programs and techniques that alter physician behavior and/or patient outcomes. Searches were limited to English-language peer-reviewed journals, supplemented with reviews of bibliographies from published articles. Reviewed re-analyses were selected for inclusion based on their being a formal meta-analysis or other structured review, preferably with calculated effect sizes. Literature reviews alone were excluded. Physicians are the focus as they are the prime decision-makers for care recommendations and allocating health resources. The search found (i) twenty-six systematic reviews quantifying or synthesizing effectiveness of CME methods to change physician practice and/or patient health outcomes and (ii) one study estimating cost-effectiveness of CME programs.

RESULTS

The twenty-six systematic reviews serve as the basis for this examination of effects of CME techniques on physician clinical-care processes and patient health outcomes (1;2;4;6;8–10;13;14;16;17;21;23;24;28;29;31–33;35–41). There may be some bias as some reviews used some of the same original trials in their analysis. This bias may tend to overstate somewhat the power of the original authors' conclusions. All used quantitative or combined quantitative and qualitative methods. Eight educational techniques were reviewed, individually, or in combination (Table 1). Twelve reviews (46.2 percent) were of RCTs exclusively, nine (34.6 percent) reviewed RCTs plus other control designs, and five (19.2 percent) included RCTs plus other control and uncontrolled studies. Eight were formal meta-analyses (10;14;16;21;28;39;40). Reviews examined at least one form of didactic or interactive education.

Table 1. Education Methods Tested

Didactic programs
Predominantly lectures and presentations that may include question and answer periods
Information only
Distribution of printed materials alone, or as part of lecture sessions
Opinion leaders
Those persons recognized locally or nationally as experts who set norms for appropriate clinical practice behavior
Clinical practice guidelines
Structured clinical diagnostic and treatment strategies based on synthesis of best available evidence, preferably from randomized control trials and meta-analyses
Interactive education
Interactive sessions of participants and presenter or leader. Interactive techniques may include role playing, case discussion, and honing newly acquired practice skills
Audit and feedback
A review of current practitioner clinical practice behavior, usually for a specified diagnosis, and recommendations for new clinical behavior if warranted.
Academic (counter-) detailing/outreach
Utilizes a personal visit by a trained professional to a physician to provide best available information on health- and medical-care interventions
Reminders
Prompts to the practitioner to provide a specific clinical intervention under defined clinical circumstances

All reviews tested effects of CME techniques to change provider behavior (care processes); sixteen tested effects on patient health outcomes. Reminders (n = 19), audit and feedback (n = 18), and didactic presentations (mainly lectures; n = 14) were the most common techniques studied. Twenty-one reviews examined effects of multiple education tools (Table 2) (1;2;4;6;8;9;21;23;24;36;38;41). Results describing education methods reported here are those of the authors of the original review.

Techniques to Change Physician Clinical Practice Behavior

Every CME technique exhibited a range of effectiveness across reviews in changing physician clinical practices (Table 3). The distributions of effects, from low to high, were those described by the authors of the original reviews. Didactic techniques and providing printed materials alone clustered in the range of no-to-low effects, whereas all interactive programs exhibited mostly moderate-to-high beneficial effects. The most commonly used techniques, thus, generally were found to have the least benefit.

Table 2. Education Programs Evaluated by Reviewed Studies

Study methods	Studies reviewed
RCTs	1;2;8;18;19;24;31;32;34;35;37;38
RCTs plus other controlled	4;7;9;16;22;23;24;32;33
RCTs, other controlled plus uncontrolled	8;10;31;38
Education programs measured	
Didactic programs	1–4;6;8;9;23;31–33;37;38
Interactive education	2;4;8;23;24;28;31;32;37;38
Audit/feedback	1;2;4;6;8;9;23;24;28;31–33;37;38;40;41
Academic detailing/outreach	1;2;4;6;8;9;23;28;31;36;38;40
Opinion leaders	4;8;9;23;28;36;38
Reminders	1;2;4;6;8;9;10;16;28;31–33;36;38–40
Clinical practice guidelines	8;10;14;15;29;31
Information only	2;4;6;8;9;23;31;38–40
Outcomes measured	
Provider-care processes	1;2;4;6;8–10;13;14;16;17;21;23;24;28;29;31–33;35–41
Patient health outcomes	1;4;5–7;9;13;14;16;22;23;24;29;31–33;35;38;40

RCTs, randomized control trials.

Table 3. Effects of Tested Interventions on Physician Care Processes

Effects on care processes	High	Moderate	Low	None
Didactic programs		17;31;41	9;15;24;31;36;40;41	4;8–10;24;29;31;38–40
Interactive education	4;9;29;36;40	4;8;31;32;36;40	31;37	
Audit/feedback	7;9;29;37;40;41	2;4;10;13;15;17;24;29;31;37;38	15;23;35;39	10;34
Academic detailing/outreach	4;9;10;29;37;40	9;10;12;17;24;37;40;41	12	
Opinion leaders		9;10;38	10;29;37;38	10;38
Reminders	1;4;6;9;10;29;31;40;41	1;15;17;22–24;31–34;37;39;41	15;23;31;33;41	
Clinical practice guidelines		4;9;14	14;15	
Information only		17;40	13;34;40	4;9;15;24;29;33;34;40

The most-effective education tools were interactive programs among practitioners and educators—audit and feedback on optimal versus actual care provided, diagnosis-specific care reminders for best care, academic detailing, and other outreach programs on best practices, clinical practice guidelines, and to a lesser extent, opinion leaders. Thus, both least- and most-effective CME techniques are well-defined.

Eight formal meta-analyses (1;2;8;31;32;36–38) reanalyzed results of RCTs of techniques to change physician practice; two also included effects on patient outcomes (Table 4) (36;37). Thomson O'Brien et al. (36–38) found moderate-to-high effect of interactive programs in changing physician care and low or no effect of didactic programs. Davis et al. (8) estimated a nonsignificant standardized effect size of 0.34 (95 percent confidence interval [CI], −0.27–0.97) for didactic programs and a significant standardized effect for interactive and mixed education programs of 0.67 (95 percent CI, 0.01–1.45). The meta-analysis by Austin et al. (1) concluded that reminders were effective in altering physician practices for cervical cancer screening (odds ratio [OR], 1.180; 95 percent CI, 1.020–1.339) and tetanus immunization (OR, 2.819; 95 percent CI, 2.664–2.975).

Table 4. Effects of Tested Interventions on Patient Health Outcomes

Effects on patient outcomes	High	Moderate	Low	None
Didactic programs				4;21;32;37
Interactive education		2;31;37	24	23;32;37
Audit/feedback		1;2;6;32;41	1;24;28	17;23
Academic detailing/outreach	32	9;31;36;40	28	
Opinion leaders	14			
Reminders	39;41	1;9;14;39	24;39	2
Clinical practice guidelines		29		
Information only			23	2;40

The meta-analysis of twelve RCTs by Balas et al. (2) found a significant effect on physician practices of audit and feedback (OR, 1.091; 95 percent CI, 1.045–1.136). The Walton et al. (39) review of reminders found significantly reduced time to achieve therapeutic control (standardized mean difference, −0.44; 95 percent CI, −0.70–0.17), reduced

toxicity levels (risk difference, −0.12; 95 percent CI, −0.24–0.01), reduced adverse medication reactions (risk difference −0.06, 95 percent CI, –0.12 to 0.00), and reduced length of hospital stays (standardized mean difference, −0.32; 95 percent CI, −0.60–0.04. Silagy et al. (32) found interactive education and reminders for smoking cessation moderately effective in altering physician practices (OR, 1.44; 95 percent CI, 1.29–1.60).

Shea et al. (31) found from their meta-analysis of sixteen RCTs of computer-based clinical reminders across six preventive services adjusted OR of 1.77 and 95 percent CI of 1.38–2.27. Reminders improved vaccinations (OR, 3.09; 95 percent CI, 2.39–4.00), breast cancer screening (OR, 1.88; 95 percent CI, 1.44–2.45), colorectal cancer screening (OR, 2.25; 95 percent CI, 1.74–2.91), and cardiovascular risk reduction (OR, 2.01; 95 percent CI, 1.55–2.61), but not cervical cancer screening (OR, 1.15; 95 percent CI, 0.89–1.49) or other preventive services (OR, 1.02; 95 percent CI, 0.79–1.32). In addition, the meta-regression analysis of 108 RCTs by Stone et al. (34) found organization change the most-effective tool to increase screening services.

Education Techniques That Improve Patient Outcomes

Multiple reviews of audit and feedback, academic detailing, and physician reminders found each moderately or highly effective in improving patient health outcomes (Table 3). One review each, for opinion leaders (37) and academic detailing/outreach (38), also found a large effect on patient outcome. Silagy et al. (32) estimated a modest effect of interactive education techniques (OR, 1.35; 95 percent CI, 1.09–1.65). Stone et al. (34) concluded economic incentives were the best motivator of patient behavior change, reminders were moderately effective, and information alone had no effect.

Are Programs to Change Practitioner Behavior Cost-Effective?

The one cost-effectiveness study, of education outreach/counterdetailing for two interventions, concluded (i) CME for angiotensin-converting enzyme inhibitors for heart failure was highly cost-effective at $2,062 per life-year saved, and (ii) reducing selective serotonin reuptake inhibitor use in favor of tricyclic antidepressants found cost per patient of outreach ($82) was greater than the savings from changing physician behavior ($75) (34).

DISCUSSION

New and effective health-care interventions continue to become available and generally are diffused relatively quickly to all high-income countries. But, less-effective care is not necessarily discarded nor is the more-effective rapidly accepted into clinical practice. Continuing wide variation in medical practice, among and within countries, means progress is slow in integrating clinical advances. These rapid changes are stressful to both physicians and prospective patients, perhaps due to lack of personal experience with the new modalities, about adopting the new and discarding the old. Continuing medical education is an important way for practitioners to understand and use new care modalities. However, the CME tools and techniques most commonly used are the least-effective ones in helping physicians adapt to new diagnostic and therapeutic interventions.

Burgeoning knowledge from RCTs and meta-analyses of CME is clear on the most-effective techniques that alter medical-care processes and patient health outcomes—interactive education, audit and feedback, reminders, academic detailing, and other outreach programs, and somewhat less so, clinical practice guidelines and opinion leaders. In addition, combining techniques, for example, interactive education plus academic detailing, leads to even greater effect than either achieves alone (23;40). The literature is also clear on the least-effective education methods—didactic lectures and distributing printed materials alone. But even a technique of low-efficacy can become useful when combined with interactive tools (17). Thus, it is apparent that insufficient information on the most-effective physician continuing education methods is not the main problem.

POLICY IMPLICATIONS

This review shows clearly that commonly used continuing medical education alone is insufficient to change clinical practice behavior and resulting patient health outcomes. The cost is enormous relative to the benefits of continued reliance mainly on didactic techniques and distributing printed materials alone; thus, the verdict must be that the large majority of these activities do not provide good value for money. But, relying on effective education techniques alone is insufficient. As Grol (16) emphasized, there must be parallel awareness first, that no single approach to professional education works best under all circumstances. Second, educators must use approaches that focus on teams and organizations within unique practitioner social, political, and economic environments.

Clear models exist that can improve the likelihood of successful integration of new knowledge into clinical practice. For example, Stone et al. (34) described key features for success such as valued members transmitting the information, targeting group interests and motivations, using collaborative teamwork, tailoring interventions to audience needs, and enlisting peer and senior management support. Successful implementation also requires awareness of local health-care organization needs, evidence of suboptimal use of effective care, and sound estimates of costs of changing behavior (15;25). Thus, means and methods to translate new

knowledge into practice are available at both health system and individual physician levels (15;40).

The remaining issue is implementation by educators, funders, and physicians. Multifaceted policies are needed for such complex policy development and implementation. Certainly, organization, delivery, and financing changes will be needed in all countries to support such changes within each country's unique health and medical-care system. The Institute of Medicine has suggested changes needed for the United States (21;22). Rarely discussed, though, are financial, organizational, physician, patient, and payer incentives (positive and negative) that can help speed the process of changing practice patterns across countries and health systems to encompass more fully the best scientific evidence into clinical care. For example, in countries that use some form of fee-for-service, physicians who provide care based on best evidence could be paid more than those who do not. Physician salaries or capitation amounts could be partially dependent on care provided based on diagnosis-specific guidelines already learned and require justification when not following evidence-based guidelines. They could also receive more CME credits when exposed to effective CME techniques. CME credits are often needed for re-certification or income increases. Payers or insurers could reimburse physicians for their time and/or direct cost of attending educational programs that used known effective techniques, for example, lecture plus audit and feedback, but not for attending lectures alone. Patients who adhere to physician recommended treatment would have their visit and pharmaceutical prescription copayment refunded. Pharmaceutical firms that do not use known effective CME techniques could not claim a tax deduction for costs of CME programs they sponsor. Thus there are multiple options for implementation. Whichever group or types are chosen, health systems must choose methods and means to get timely and effective care to patients within increasingly constrained national health-care expenditures.

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REFERENCES

1. Austin SM, Balas EA, Mitchell JA, Ewigman BG. *Effect of physician reminders on preventive care: Meta-analysis of randomized clinical trials*. Proceedings—the Annual Symposium on Computer Applications in Medical Care 1994;120:121-124.
2. Balas EA, Austin Boren S, Brown GD, et al. Effect of physician profiling on utilization: Meta-analysis of randomized clinical trials. *J Gen Intern Med*. 1996;11:584-590.
3. Berger ML, Nebenfuhr P, Murray RK. The value of disease management—approaching the industrialisation of modern medicine. *Dis Manage Health Outcomes*. 2000;8:181-184.
4. Bero LA, Grilli R, Grimshaw JM, et al. Closing the gap between research and practice: An overview of systematic reviews of interventions to promote the implementation of research findings. *BMJ*. 1998;317:465-468.
5. Bloom BS, Smith WP, Weitz D, LaMont B. The diagnostic and treatment approach to two common conditions by the members of a community health maintenance organization. *Am J Manage Care*. 1997;3:733-736.
6. Buntinx F, Winkins R, Grol R, Knotternerus JA. Influencing diagnostic and preventive performance in ambulatory care by feedback and reminders. A review. *Fam Pract*. 1993;10:219-228.
7. Chassin MR, Korsecoff JB, Park RE, et al. Does inappropriate use explain geographic variations in the use of health services? A study of three procedures. *JAMA*. 1987;258:2533-2537.
8. Davis D, O'Brien MA, Freemantle N, et al. Impact of formal continuing medical education: Do conferences, workshops, rounds, and other continuing education activities change physician behavior or health care outcomes? *JAMA*. 1999;282:867-874.
9. Davis DA, Taylor-Vaisey A. Translating guidelines into practice: A systematic review of theoretic concepts and research evidence in the adoption of clinical practice guidelines. CMAJ 1995;157:408-416.
10. Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance: A systematic review of the effect of continuing medical education strategies. *JAMA*. 1995;274:700-705.
11. Fendrick AM, Ridker PM, Bloom BS. Improved health benefits of increased use of thrombolytic therapy. *Arch Intern Med*. 1994;154:1605-1609.
12. Fendrick AM, Smith DG, Chernew ME, Shah SN. A benefit-based co-pay for prescription drugs: Patient contribution based on total benefits, not drug acquisition cost. *Am J Manage Care*. 2001;7:861-867.
13. Freemantle N, Harvey EL, Wolf F, et al. Printed educational materials: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;(2):CD000172.
14. Grimshaw J, Freemantle N, Wallace S, et al. Developing and implementing clinical practice guidelines. *Qual Health Care*. 1994;4:55-64.
15. Grimshaw JM, Thomas RE, MacLennan G, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess*. 2004;8:iii-iv, 1-72.
16. Grol R. Improving the quality of medical care: Building bridges among professional pride, payer profit and patient satisfaction. *JAMA*. 2001;286:2578-2585.
17. Haynes RB, Davis DA, McKibbon A, Tugwell P. A critical appraisal of the efficacy of continuing medical education. *JAMA*. 1984;251:61-64.
18. Heffler S, Levit K, Smith S, et al. Health spending growth up in 1999; Faster growth expected in the future. *Health Aff (Millwood)*. 2001;20:193-203.
19. Hellinger FJ. The impact of financial incentives on physician behavior in managed care plans: A review of the evidence. *Med Care Res Rev*. 1996;53:294-314.
20. Ibrahim SA, Kwoh CK. Underutilization of oral anticoagulant therapy for stroke prevention in elderly patients with heart failure. *Am Heart J*. 2000;140:219-220.

21. Institute of Medicine. *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academy Press; 2001.
22. Institute of Medicine. *To err is human: Building a safer health system*. In: Kohn LT, Corrigan JM, Donaldson MS, eds. Washington, DC: National Academy Press; 2000.
23. Johnston ME, Langton KB, Haynes RB, Mathieu A. Effects of computer-based clinical decision support systems on clinician performance and patient outcome: A critical appraisal of research. *Ann Intern Med*. 1994;120:135-142.
24. Lomas J. Haynes RB. A taxonomy and critical review of tested strategies for the application of clinical practice recommendations: From "official" to "individual" clinical policy. *Am J Prev Med*. 1988;4(Suppl):77-94.
25. Mason J, Freemantle N, Nazareth I, et al. When is it cost-effective to change behavior of health professionals? *JAMA*. 2001;286:2988-2992.
26. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348:2635-2645.
27. Miller NF. Hysterectomy: Therapeutic necessity or surgical racket. *Am J Obstet Gynecol*. 1946;51:804-810.
28. Morrison A, Wertheimer AI, Berger ML. Interventions to improve antihypertensive drug adherence: A quantitative review of trials. *Formulary*. 2000;35:234-255.
29. Oxman AD, Thomson MA, Davis DA, Haynes RB. No magic bullets: A systematic review of 102 trials of interventions to improve professional practice. CMAJ 1995;153:1423-1431.
30. Peterson OL, Andrews LP, Spain RS, Greenberg BG. An analytical study of North Carolina general practice. *J Med Education*. 1956;(Pt 2):1-165.
31. Shea S, DuMouchel W, Bahamonde L. A meta-analysis of 16 randomized control trials to evaluate computer-based clinical reminder systems in preventive care in ambulatory settings. *J Am Inform Assoc*. 1996;3:399-409.
32. Silagy C, Lancaster T, Fowler G. Effectiveness of training health professionals to provide smoking cessation interventions: Systematic review of randomised controlled trials. *Qual Health Care*. 1994;3:193-198.
33. Soumerai SB, McLaughlin TJ, Avorn J. Quality assurance for drug prescribing. *Qual Assur Health Care*. 1990;2:37-58.
34. Stone EG, Morton SC, Hulscher ME, et al. Interventions that increase use of adult immunizations and cancer screening services. *Ann Intern Med*. 2002;136:641-651.
35. Thomson O'Brien MA, Oxman AD, Davis DA, et al. Audit and feedback: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;(2):CD000259.
36. Thomson O'Brien MA, Freemantle N, Oxman AD, et al. Continuing education meetings and workshops: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2001;(2):CD003030 .
37. Thomson O'Brien MA, Oxman AD, Davis DA, et al. Educational outreach visits: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;(2): CD000409.
38. Thomson O'Brien MA, Oxman AD, Haynes RB, et al. Local opinion leaders: Effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;(2):CD000125.
39. Walton RT, Harvey E, Dovey S, Freemantle N. Computerised advice on drug dosage to improve prescribing practice. *Cochrane Database Syst Rev*. 2001;(1):CD002894.
40. Wensing M, Grol R. Single and combined strategies for implementing changes in primary care: A literature review. *Int J Qual Health Care*. 1994;6:115-132.
41. Yano EM, Fink A, Hirsch SH, Robbins AS, Rubinstein LV. Helping practices reach primary care goals: Lessons from the literature. *Arch Intern Med.* 1995;155:1146-1156.

PRINCIPLES OF ADULT LEARNING

By Stephen Lieb
Senior Technical Writer and Planner, Arizona Department of Health Services
and part-time Instructor, South Mountain Community College
from VISION, Fall 1991

Adults As Learners

Part of being an effective instructor involves understanding how adults learn best. Compared to children and teens, adults have special needs and requirements as learners. Despite the apparent truth, adult learning is a relatively new area of study. The field of adult learning was pioneered by Malcom Knowles. He identified the following characteristics of adult learners:

- Adults are *autonomous* and *self-directed.* They need to be free to direct themselves. Their teachers must actively involve adult participants in the learning process and serve as facilitators for them. Specifically, they must get participants' perspectives about what topics to cover and let them work on projects that reflect their interests. They should allow the participants to assume responsibility for presentations and group leadership. They have to be sure to act as facilitators, guiding participants to their own knowledge rather than supplying them with facts. Finally, they must show participants how the class will help them reach their goals (e.g., via a personal goals sheet).
- Adults have accumulated a foundation of *life experiences* and *knowledge* that may include work-related activities, family responsibilities, and previous education. They need to connect learning to this knowledge/experience base. To help them do so, they should draw out participants' experience and knowledge which is relevant to the topic. They must relate theories and concepts to the participants and recognize the value of experience in learning.
- Adults are *goal-oriented*. Upon enrolling in a course, they usually know what goal they want to attain. They, therefore, appreciate an educational program that is organized and has clearly defined elements. Instructors must show participants how this class will help them attain their goals. This classification of gaols and course objectives must be done early in the course.
- Adults are *relevancy-oriented*. They must see a reason for learning something. Learning has to be applicable to their work or other responsibilities to be of value to them. Therefore, instructors must identify objectives for adult participants before the course begins. This means, also, that theories and concepts must be related to a setting familiar to participants. This need can be fulfilled by letting participants choose projects that reflect their own interests.
- Adults are *practical*, focusing on the aspects of a lesson most useful to them in their work. They may not be interested in knowledge for its own sake. Instructors must tell participants explicitly how the lesson will be useful to

them on the job.
- As do all learners, adults need to be shown *respect*. Instructors must acknowledge the wealth of experiences that adult participants bring to the classroom. These adults should be treated as equals in experience and knowledge and allowed to voice their opinions freely in class.

Motivating the Adult Learner

Another aspect of adult learning is motivation. At least six factors serve as sources of motivation for adult learning:

- **Social relationships:** to make new friends, to meet a need for associations and friendships.
- **External expectations:** to comply with instructions from someone else; to fulfill the expectations or recommendations of someone with formal authority.
- **Social welfare:** to improve ability to serve mankind, prepare for service to the community, and improve ability to participate in community work.
- **Personal advancement:** to achieve higher status in a job, secure professional advancement, and stay abreast of competitors.
- **Escape/Stimulation:** to relieve boredom, provide a break in the routine of home or work, and provide a contrast to other exacting details of life.
- **Cognitive interest:** to learn for the sake of learning, seek knowledge for its own sake, and to satisfy an inquiring mind.

Barriers and Motivation

Unlike children and teenagers, adults have many responsibilities that they must balance against the demands of learning. Because of these responsibilities, adults have *barriers against participating in learning*. Some of these barriers include lack of time, money, confidence, or interest, lack of information about opportunities to learn, scheduling problems, "red tape," and problems with child care and transportation.

Motivation factors can also be a barrier. What motivates adult learners? Typical motivations include a requirement for competence or licensing, an expected (or realized) promotion, job enrichment, a need to maintain old skills or learn new ones, a need to adapt to job changes, or the need to learn in order to comply with company directives.

The best way to motivate adult learners is simply to *enhance* their reasons for enrolling and *decrease* the barriers. Instructors must learn why their students are enrolled (the motivators); they have to discover what is keeping them from learning. Then the instructors must plan their motivating strategies. A successful strategy

includes showing adult learners the relationship between training and an expected promotion.

Learning Tips for Effective Instructors

Educators must remember that learning occurs within each individual as a continual process throughout life. People learn at different speeds, so it is natural for them to be anxious or nervous when faced with a learning situation. Positive reinforcement by the instructor can enhance learning, as can proper timing of the instruction.

Learning results from stimulation of the senses. In some people, one sense is used more than others to learn or recall information. Instructors should present materials that stimulates as many senses as possible in order to increase their chances of teaching success.

There are four critical elements of learning that must be addressed to ensure that participants learn. These elements are

1. **motivation**
2. **reinforcement**
3. **retention**
4. **transference**

Motivation. If the participant does not recognize the need for the information (or has been offended or intimidated), all of the instructor's effort to assist the participant to learn will be in vain. The instructor must establish rapport with participants and prepare them for learning; this provides motivation. Instructors can motivate students via several means:

- **Set a feeling or tone for the lesson.** Instructors should try to establish a friendly, open atmosphere that shows the participants they will help them learn.
- **Set an appropriate level of concern.** The level of tension must be adjusted to meet the level of importance of the objective. If the material has a high level of importance, a higher level of tension/stress should be established in the class. However, people learn best under low to moderate stress; if the stress is too high, it becomes a barrier to learning.
- **Set an appropriate level of difficulty.** The degree of difficulty should be set high enough to challenge participants but not so high that they become frustrated by information overload. The instruction should predict and reward participation, culminating in success.

In addition, participants need specific knowledge of their learning results (*feedback*). Feedback must be specific, not general. Participants must also see a *reward* for learning. The reward does not necessarily have to be monetary; it can be simply a demonstration of benefits to be realized from learning the material. Finally, the

participant must be **interested** in the subject. Interest is directly related to reward. Adults must see the benefit of learning in order to motivate themselves to learn the subject.

Reinforcement. Reinforcement is a very necessary part of the teaching/learning process; through it, instructors encourage correct modes of behavior and performance.

- *Positive reinforcement* is normally used by instructors who are teaching participants new skills. As the name implies, positive reinforcement is "good" and reinforces "good" (or positive) behavior.
- *Negative reinforcement* is normally used by instructors teaching a new skill or new information. It is useful in trying to change modes of behavior. The result of negative reinforcement is *extinction* -- that is, the instructor uses negative reinforcement until the "bad" behavior disappears, or it becomes extinct.

When instructors are trying to change behaviors (old practices), they should apply both positive and negative reinforcement.

Reinforcement should be part of the teaching-learning process to ensure correct behavior. Instructors need to use it on a frequent and regular basis early in the process to help the students retain what they have learned. Then, they should use reinforcement only to maintain consistent, positive behavior.

Retention. Students must retain information from classes in order to benefit from the learning. The instructors' jobs are not finished until they have assisted the learner in retaining the information. In order for participants to retain the information taught, they must see a meaning or purpose for that information. The must also understand and be able to interpret and apply the information. This understanding includes their ability to assign the correct degree of importance to the material.

The amount of retention will be directly affected by the degree of original learning. Simply stated, if the participants did not learn the material well initially, they will not retain it well either.

Retention by the participants is directly affected by their amount of practice during the learning. Instructors should emphasize retention and application. After the students demonstrate correct (desired) performance, they should be urged to practice to maintain the desired performance. Distributed practice is similar in effect to intermittent reinforcement.

Transference. Transfer of learning is the result of training -- it is the ability to use the information taught in the course but in a new setting. As with reinforcement, there are two types of transfer: *positive* and *negative*.

- Positive transference, like positive reinforcement, occurs when the participants uses the behavior taught in the course.
- Negative transference, again like negative reinforcement, occurs when the participants do not do what they are told not to do. This results in a positive (desired) outcome.

Transference is most likely to occur in the following situations:

- *Association* -- participants can associate the new information with something that they already know.
- *Similarity* -- the information is similar to material that participants already know; that is, it revisits a logical framework or pattern.
- *Degree of original learning* -- participant's degree of original learning was high.
- *Critical attribute element* -- the information learned contains elements that are extremely beneficial (critical) on the job.

Although adult learning is relatively new as field of study, it is just as substantial as traditional education and carries and potential for greater success. Of course, the heightened success requires a greater responsibility on the part of the teacher. Additionally, the learners come to the course with precisely defined expectations. Unfortunately, there are barriers to their learning. The best motivators for adult learners are interest and selfish benefit. If they can be shown that the course benefits them pragmatically, they will perform better, and the benefits will be longer lasting.

Adult Learning Theory

Pathways Home

Speck (1996) notes that the following important points of adult learning theory should be considered when professional development activities are designed for educators:

- "Adults will commit to learning when the goals and objectives are considered realistic and important to them. Application in the 'real world' is important and relevant to the adult learner's personal and professional needs.
- Adults want to be the origin of their own learning and will resist learning activities they believe are an attack on their competence. Thus, professional development needs to give participants some control over the what, who, how, why, when, and where of their learning.
- Adult learners need to see that the professional development learning and their day-to-day activities are related and relevant.
- Adult learners need direct, concrete experiences in which they apply the learning in real work.
- Adult learning has ego involved. Professional development must be structured to provide support from peers and to reduce the fear of judgment during learning.
- Adults need to receive feedback on how they are doing and the results of their efforts. Opportunities must be built into professional development activities that allow the learner to practice the learning and receive structured, helpful feedback.
- Adults need to participate in small-group activities during the learning to move them beyond understanding to application, analysis, synthesis, and evaluation. Small-group activities provide an opportunity to share, reflect, and generalize their learning experiences.
- Adult learners come to learning with a wide range of previous experiences, knowledge, self-direction, interests, and competencies. This diversity must be accommodated in the professional development planning.
- Transfer of learning for adults is not automatic and must be facilitated. Coaching and other kinds of follow-up support are needed to help adult learners transfer learning into daily practice so that it is sustained." (pp. 36-37)

Andragogy and Technology: Integrating Adult Learning Theory As We Teach With Technology

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Abstract

Introducing technology into the curriculum means more than just "making it work." The principles of adult learning theory can be used in the design of technology-based instruction to make it more effective. Malcolm Knowles' theory of andragogy allows teacher/facilitators to structure lessons which are part of a relevant learning environment for adults students.

Introduction

Higher education has given priority to the integration of technology into the curriculum. As this has occurred, institutions are faced with the many issues that surround making the lessons succeed technologically. Faculty must spend time learning how to use the technology and ensuring that adequate institutional support is present to make the technology work. It is, therefore, easy for the instructional design of such curricula to be put on the side while we get technology issues "under control." Faculty need to focus on learning theory in the design of instructional technology so that they can create lessons that are not only technology-effective but that are meaningful from the learner's standpoint. Malcolm Knowles' theory of andragogy outlines effective methodologies for adult learning. When this theory is integrated into the design of technology-based learning environments it is possible to create lessons that not only serve the needs of students to use the latest technology but also focus on their requirements as an adult. Andragogy includes ideas such as an adult's readiness to learn, the role of the learner's experiences, the faculty member as a facilitator of learning, an adult's orientation to learning, and the learner's self concept.

What is Andragogy?

Andragogy is a set of assumptions about how adults learn. Its roots can be traced back to Alexander Kapp, a German grammar teacher who used it to describe Plato's educational theory

(Knowles, Holton, and Swanson 1998, 59). It appeared again in 1921 when another German, Social Scientist, Eugen Rosenstock claimed that "adult education required special teachers, special methods, and a special philosophy." (Knowles, Holton, and Swanson 1998, 59) There is evidence that discussion of andragogy continued in Europe until Dusan Savicevic, a Yugoslavian adult educator, first discussed the concept in the United States. Malcolm Knowles heard about the term and in 1968 used it in an article in Adult Leadership. From that point on, Knowles has become known as the principle expert on andragogy although numerous adult educators including Brookfield (1986), Mezirow (1991), Lawler (1991) and Merriam (1999) have addressed the concept and/or discussed how it can be used to facilitate adult learning.

Technology and the Assumptions of Andragogy

Knowles, Holton and Swanson (1998) discuss six assumptions of andragogy. Following are expanded definitions of those assumptions with their implications for technology-based instruction:

- The Learner's Need to Know

Adults need to know why they should learn something. Under the more standard pedagogical model it is assumed that the student will simply learn what they are told. Adults, however, are used to understanding what they do in life. They want to know the reason they need to learn something or how it will benefit them. This may be accomplished before students even engage technology, such as if a Spanish class is required to fill a language elective to complete a degree, however, it is wise for the faculty member to help students understand how what they will learn will be of use to them in the future. The required Spanish language lessons will be more affective if the student feels that it will increase her/his ability to understand a bilingual colleague on the job.

One way to help students see the value of the lessons is to ask the student, either online or in an initial face-to-face meeting, to do some reflection on what they expect to learn, how they might use it in the future or how it will help them to meet their goals. Patricia Lawler (1991, 36) suggests that these goals and expectations can be used throughout the program to reinforce the importance of learning activities. The design of technology-based lessons can incorporate not only the students' original reflections but can solicit feedback about the relevance of the ongoing learning process throughout the course. It is incumbent upon the instructor to review these reflections and to adjust the technology or suggest an individual lesson structure to more effectively meet student needs.

- The Learner's Self-concept

Knowles, Holton, and Swanson emphasize that "adults resent and resist situations in

which they feel others are imposing their wills on them." (1998, 65) In spite of their need for autonomy, previous schooling has made them dependent learners. It is the job of the adult educator to move adult students away from their old habits and into new patterns of learning where they become self-directed, taking responsibility for their own learning and the direction it takes. Technology is a perfect path for the facilitation of self-direction. The ultimate ability of initiatives such as web-based learning to be non-linear allows an adult to follow the path that most appropriately reflects their need to learn. It becomes extremely important for those who are designing technology-based adult learning to use all of the capabilities of the technology including branching, the ability to skip sections a student already understands, and multiple forms of presentation of material which can assist people with various learning styles. All of these can be used to permit students to follow a path of learning that most appropriately suits them.

There is, however, one final piece that needs to be added when students are learning with technology. There must be some way to help learners who are still moving into the self-directed mode. Those learners who are new to adult education or who for some reason have not experienced the ability to be self-directed learners in the past need a structure which will help them to grow. Particular attention should be given to students who may not want to spend time outside of a classroom situation; who prefer to be spoon-fed material during a regularly scheduled session. This type of student may exhibit negative opinions of having to use technology as the only means of learning as they will need to take responsibility and direct their own learning. The instructor must find ways to move these learners into self-direction by giving them short, directed, concrete online tasks that provide the most "learning for the experience" to make these adults see the relevancy of online learning.

It is also important that self-directedness not be confused with self-motivation. Although a student may be motivated to take a course, they may not be self-directed enough to feel comfortable choosing instructional modules in an online course or creating their own structured environment to learn in a web-based course.

Encouraging self-directedness may also take the form of additional instructor contact in the beginning stages of the class or could be facilitated by having students do technology-based modules within a traditional class before they move to a complete course based in technology.

- The Role of the Learner's Experience

Adults have had a lifetime of experiences. These make adult learners more heterogeneous than younger learners and also provides an additional base of knowledge that can and should be used in the classroom or technology-based learning experience. Adults want to use what they know and want to be acknowledged for having that knowledge. The design of technology-based instruction must include opportunities for learners to use their knowledge and experience. Case studies, reflective activities, group projects that call upon the expertise of group members and lab experiments are examples of the type of learning activities which will facilitate the use of learners' already acquired expertise.

An important corollary to the experience that adults bring with them is the association of their experiences with who they are. Their self-identity including habits and biases are determined from their experience. It is for this reason that those developing technology-based instruction for adult learners need to create opportunities for what Jack Mezirow calls "reflective learning." (1991, 6) As Mezirow states, "reflective learning involves assessment or reassessment of assumptions" (1991, 6) and "reflective learning becomes transformative whenever assumptions or premises are found to be distorting, inauthentic or otherwise invalid." (1991, 6) Reflective learning activities can assist students in examining their biases and habits and move them toward a new understanding of information presented. Using web-based or other technologies to have students reflect on learning activities or to put themselves in a different character in a case study or scenario may cause adults to reevaluate already learned information or patterns.

- A Student's Readiness to Learn

Adults become ready to learn something when, as Knowles explained, "they experience a need to learn it in order to cope more satisfyingly with real-life tasks or problems." (1980, 44) It is important that lessons developed in technology-based opportunities should, where possible, be concrete and relate to students' needs and future goals. These may be adapted from the goals of the course or learning program but can also grow out to the requests for student expectations that were mentioned earlier. In addition, an instructor can encourage students' readiness by designing experiences which simulate situations where the student will encounter a need for the knowledge or skill presented. Students in a personnel management course may not see the need for learning about the Family and Medical Leave Act but an interactive role play that puts students in the place of a manager who must deal with an employee's request for leave due to a child's illness will help them see how an understanding of the topic will benefit them in the future.

- The Student's Orientation to Learning

Adults are life, task or problem-centered in their orientation to learning. They want to see how what they are learning will apply to their life, a task they need to perform, or to solving a problem. Technology-based instruction will be more effective if it uses real-life examples or situations that adult learners may encounter in their life or on the job. Allowing flexibility in the design of a lesson will permit student input on issues that need to be addressed in a class. If students can bring real-life examples of school discipline challenges to a chat session in an online course on behavior management they will be anxious to participate and gain the practical experience which will help them to do better at their job.

- Students' Motivation to Learn

While adult learners may respond to external motivators, internal priorities are more important. Incentives such as increased job satisfaction, self-esteem and quality of life are important in giving adults a reason to learn. If any of these can be related as part of technology-based instruction adults will respond more positively. Activities that build students' self-esteem, or sense of accomplishment through, for example, the completion of goals or modules that can be checked off in a sequence, may help motivate completion of a longer lesson. In addition, student's input into the development of lessons or in the prioritization of topics covered can help students to take ownership of the learning process.

Conclusion

To facilitate the use of andragogy while teaching with technology we must use technology to its fullest. Arguments for the use of technology many times include statements about its flexibility and the ability of the learner to move through lessons any time, anywhere, and at their own pace. These arguments also include logical explanations of how a learner may adapt the lessons or material to cover what they need to learn and eliminate the material that is not appropriate or that they have already learned. To adapt to the needs of adult students, these definitions of technology-based learning must be utilized to make its design interactive, learner-centered and to facilitate self-direction in learners.

Educators who are using adult education concepts in the development of their lessons must also become facilitators of learning. They must structure student input into their design and create technology-based lessons which can easily be adapted to make the presentation of topics relevant to those they teach.

If these guidelines are followed, the instruction that is developed will be not only technologically workable but also effective from a learner's perspective.

References

Brookfield, Stephen D. 1986. Understanding and Facilitating Adult Learning. San Francisco: Jossey Bass.

Knowles, Malcolm S. 1980. The Modern Practice of Adult Education; From Andragogy to Pedagogy. Englewood Cliffs, NJ: Cambridge Adult Education.

Knowles, Malcolm S., Elwood F. Holton III, and Richard A. Swanson. 1998. The Adult Learner. Houston: Gulf Publishing.

Lawler, Patricia A. 1991. The Keys to Adult Learning: Theory and Practical Strategies.

Philadelphia: Research for Better Schools.

Merriam, Sharan B. and Rosemary S. Caffarella. 1999. Learning in Adulthood: A Comprehensive Guide. San Francisco: Jossey Bass.

Mezirow, Jack. 1991.Transformative Dimensions of Adult Learning. San Francisco: Jossey Bass.

The Adult Learner: A Mythical Species

Geoffrey R. Norman, PhD

Abstract: Adult learning theory, first described by Malcolm Knowles in the early 1970s, is based on a number of apparently self-evident axioms about how adults learn. The fundamental assumptions remain largely untested, and a critical analysis suggests that they may be largely a product of the environment in which adults find themselves rather than of any innate differences between adults and children. What evidence does exist suggests that one critical component of adult learning, self-assessment, is not easy. Further, while students can learn the skills to learn on their own (i.e., can acquire self-directed learning skills), this does not translate into greater competence, in either the short or long term. Uncritical reliance on the principles of adult learning may have detrimental consequences, particularly in the domain of maintenance of competence.

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In the early 1970s, Malcolm Knowles, the guru of adult education, published an important book, *The Adult Learner: A Neglected Species*,[1] which laid out the basic principles of what came to be known as adult learning theory. This book had a profound effect on all aspects of post-secondary education. In particular, Knowles's basic premises, the "principles of adult learning," became a rallying call for health professionals, particularly those involved in continuing education. In hindsight, it is not surprising that this approach was attractive to sensible, liberal educators. Psychology and education were still very much in the clutches of the behaviorists, with their rats, pigeons, behavioral objectives, and all manner of thought control. Cognitive psychology was in its infancy; Neisser's first textbook in the field[2] was only five years old. Knowles spends considerable time discussing the behaviorists' learning theories, basically as a contrast to his more humanistic position. It was an easy straw man; behaviorists viewed all learning as a response to external stimuli without any intention on the part of the learner, and they exorcized such mental processes as thinking, imagery, problem solving and motivation from the purview of "scientific" psychology. Behavioral psychology also took hold in education, where we were all exhorted to write detailed behavioral objectives, and assured that once this was complete, all our teaching, learning, and evaluation problems would disappear. Such a mechanistic and reductionistic perspective, while it may have kept a generation or two of experimental psychologists off the bread lines, would hardly go down well in the flower-child era (or now, for that matter).

Knowles used the observations and theories of others from Allport to Zadeh to develop "adult learning theory." In his words, "For over two decades I have been trying to formulate a theory of adult learning that takes into account what we know from experience and research about the unique characteristics of adult learners."[1] His theory contains the following assumptions:

1. As an individual matures, his or her self-concept moves from one of total dependency to one of increasing self-directedness.
2. As an individual matures, the individual accumulates an expanding reservoir of experience that causes him or her to become an increasingly rich resource for learning.
3. As an individual matures, his or her readiness to learn is decreasingly the product of biological development and academic pressure and is increasingly the product of the developmental tasks required for the performance of evolving social roles.
4. Children have been conditioned to have a subject-centered orientation to most learning, whereas adults tend to have a problem-centered orientation to learning (Let's hear it for problem-based learning! But note the word "conditioning.")

In the rest of the book, Knowles synthesizes the work of other scholars to derive his theories of adult learning. I am not denigrating this kind of synthesizing of ideas, by the way; we all do it, and that's what a lot of scholarship is about. However, Knowles, in his attempt to be comprehen-

sive, sometimes stretches this approach a bit far, extending all the way to using Newtonian mechanics as a metaphor for the old ways of teaching and relativity as an analogy for the new approach. Although the book is a monumental feat of scholarship, drawing on threads from many areas of sociology and psychology in the service of a new approach to learning, nowhere did Knowles ever lift an experimental finger to test any of his assumptions. This continues to be a conspicuous problem in the adult learning field.

Perhaps "axioms" is a better word than assumptions for Knowles's assertions about adult learners. On the one hand, they do seem self-evident when described as they are above. And certainly they appear to their proponents to have the status of axioms—assertions that demand no proof. Perhaps this is too strong a statement but the irony in adult learning theory is that although many bear allegiance to its principles, to my knowledge it has been subjected to no more critical empirical theory testing than has naturopathy or astrology.

There is some reason to challenge these assumptions. If we wish to assert that adult learners are different from younger learners (remember *androgogy*—what a horrible neologism!), then a few things follow. First we need to be clear about the age at which this transformation occurs. While specifics are strangely absent from Knowles's seminal work, it would seem reasonable that the age must conform roughly to the age adulthood is considered to begin—perhaps about the time someone can vote, can drive, can drink, or can become a parent—somewhere, let's say, between 16 and 25. Accepting that fairly broad window, we can now go further. If Knowles is right, then something developmental must happen at this point to signal fundamental changes in how people learn. Further, this something must be related to either an internal biological change or an external social one—that is, it has to be the result of either nature or nurture.

Let's try the nature hypothesis first. There are many theories about how our minds develop; most educators have a passing familiarity with Piaget, perhaps the most well-known theorist in this field. There are also well-documented phenomena of psychological maturation, such as the observation that you cannot learn perfect pitch if you start after 6 or 8 or that Asians cannot hear the difference between the sound of an "l" and that of an "r" if they have not been exposed to Western languages before 6 or 8. And that's the rub—nearly all of these developmental theories and observations cover a developmental span between age 0 (or minus a bit) and about 6 to 9, and none extends to adolescence (except for the well-documented observation, confirmed by generations of parents, that adolescents really are slaves to their hormones). So the differences theorized by Knowles have very little basis in what we know about human mental development.

That means the transition from pedagogy to "androgogy" is a consequence of the external environment; more of a sociologic than a psychological phenomenon. If this observation holds, it casts adult learning in a different light. It is perfectly plausible that adults, with their multiple responsibilities, little free time, etc., may have many of the characteristics Knowles ascribed to them—in other words, their different style of learning may simply be a consequence of the circumstances of adult life. But if, as some have asserted, PBL and self-directed learning are good for learners of all ages, then why not introduce "adult learning theory" into high school, or grade school, or, for that matter, preschool day care? If we did this successfully, it would make a mockery of the basic theory.

But perhaps this sounds a bit like philosophical sour grapes. After all, if adult learning theory does nothing more than make us think a little more carefully about the characteristics of our learners, it can hardly be viewed as sinister or subversive. But it's when we come to the next bit—the coupling of adult learning theory with "self-directed learning"—that the ideas may become less benign.

The Problem with "Self-directed" Learning

The idea of self-directed learning is that we are all individuals with unique needs and aspirations, strengths and weaknesses, and, consequently, our own learning needs. For us to be successful learners, we must become self-directed learners; we must learn how to identify our weaknesses and devise strategies to overcome them. All this sounds pretty reasonable as well, and is certainly descriptive of much of continuing education. But two caveats are necessary.

First, in order to achieve self-directed learning, you have to be able to identify your weaknesses, so you have to be good at self-assessment. But study after study of medical students shows that they are pretty awful at self-assessment.[3] Maybe they aren't adult enough, but crikey, isn't mid-20s getting pretty close? Maybe they're poor self assessors because their teachers have never taken the principles of adult learning to heart and shown them how. But Gordon[4] has also examined studies of instructional approaches that teach self-assessment, and found that they are successful in limited domains only. A more reasonable explanation is that we're all human, adult or not, and it is part of the human condition to suppress our inadequacies, to both ourselves and others. Further, while it would be nice if we could trust folks to seek out education to redress their deficiencies, people generally like the reward that comes from success, and left to their own devices gravitate to studying things they enjoy and are already pretty good at.[5]

Second, when it comes to evening pottery classes, I'm all for self-directed learning. No one should force me to make

ashtrays if I don't smoke, or teapots if I drink only coffee. But it is difficult for me to conceive of a domain of learning where self-direction is less appropriate than in medicine. All professions are defined as such because they possess common and specialized funds of knowledge. To assume that mastery of this knowledge can be left to chance or whim (or what amounts to nearly the same thing—individual self-direction) strikes at the core of professionalism. Moreover, there are few professions in which having a common core of knowledge seems more sensible than it seems in medicine. I can live with the idea that a patent lawyer may have only minimal familiarity with tort law or criminal law. But when an accident victim is lying beside the road, the call goes out for a doctor—not a traumatologist. We have an expectation that all doctors will have a reasonable amount of knowledge about all aspects of medicine. And while our liberal curricula may put in lots of elective time, the licensing examinations don't, fortunately, have a format such as "Answer any five of the following 12 questions." So the notion that students should be able to formulate their own learning objectives based on their own interests flies in the face of a lot of knowledge about human foibles and the nature of professions. While it is likely to be a good idea for students to find out information for themselves rather than having to be told what chapters and pages they have to study, *what* is to be learned as opposed to *how* it is to be learned should be nonnegotiable (at least at the level of core competencies). This thought was put succinctly by a colleague, P.K. Rangachari, who said, "We have a self-directed curriculum, not a self-indulgent curriculum."

If you are wearying of the rhetoric, let's look at the evidence. After all, problem-based, self-directed curricula have been around for nigh on 30 years. And open classrooms and "do your own thing" curricula were popular in schools in the sixties. Surely we can find some evidence that all that self-direction has had a real effect on outcomes?

Sure can. At the process level, we can conclude that teaching students how to be self-directed makes them self-directed. Studies by Blumberg at Rush[6] and Marshall and Fitzgerald[7] at McMaster and Toronto showed that students in PBL curricula really do much more self-directed learning than those in traditional tracks and that these skills are maintained in clerkship. But all that self-direction is of little import if it doesn't make more knowledgeable and competent graduates. Well, the finding that PBL curricula graduates do about the same as traditional graduates on national board exams is now well established.[8,9] However, there is little evidence that they are any better at keeping up. One study that purports to show that PBL graduates maintain their knowledge at a current level[10] was less than overwhelming. Graduates from McMaster (PBL curriculum) did better on a test of knowledge of hypertension than did Toronto (traditional curriculum) graduates about ten years after graduation. However, the difference amounted to about 6%, or one test item. The authors went further and plotted the slope of performance against time since graduation. While McMaster looked flat and Toronto looked negative, the differences were not actually statistically significant.

And as for K–12 (kindergarten to Grade 12), while it is popular to decry how standards are slipping and the current generation isn't as smart, motivated, or charming as our own (a pastime that probably dates back to Hippocrates), a careful study of SAT scores over the past five decades showed that the only decade where there was a decline in scores was during the open-classroom, do-your-own-thing sixties.[11]

Conclusion

While adult learning principles (I refuse to use the term adult learning theory until that "theory" is either confirmed or refuted by critical experiments) are useful for reminding us that we shouldn't steamroll over learners with our ideas of what's important and what's not, glorifying the principles as a major advance in educational theory is neither honest nor particularly helpful.

Adult learning theory has served a useful role in putting the learner and his or her individual aspirations back in the teaching–learning equation, and thereby redressing some of the excesses of the behaviorists. But like all good things, it succeeds in moderation only. When carried to excess, it creates its own tyranny. On the one hand, a literal interpretation of the canons of self-directed learning has led to strategies such as MOCOMP (maintenance of competence),[12,13] where we put absolute faith in the individual professional to define and remediate his or her own learning needs. Until evidence accrues that this is a defensible strategy, and individuals who practice good self-directed learning according to the criteria established by the organizations are those who really do remain competent, then this approach is not a defensible alternative to other forms of competence assurance such as formal peer review. On the other hand, restricting the application of these principles to adults, however defined, may stifle the introduction of effective educational practices earlier in the life cycle, to the detriment of younger students who might profit from them.

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References

1. Knowles M. The Adult Learner: A Neglected Species. Houston, TX: Gulf Publishing, 1973.
2. Neisser U. Cognitive Psychology. New York: Appleton–Century–Crofts, 1967.
3. Gordon MJ. A review of the validity and accuracy of self-assessments in health professions training. Acad Med. 1991; 66: 762–9.
4. Gordon MJ. Self assessment programs and their implications for health professions training. Acad Med. 1992; 67:672–9.
5. Sibley JC, Sackett DL, Neufeld VR, Rudnick KV, Fraser W, Gerrard B. A randomized trial of continuing medical education. N Engl J Med. 1982; 306: 511–5.
6. Blumberg P, Michael JA. Development of self-directed learning behaviors in a partially teacher-directed problem-based learning curriculum. Teach Learn Med. 1992; 1:3–8.
7. Marshall JG, Fitzgerald D, Busby L, Heaton G. A study of library use in problem-based and traditional medical curricula. Bull Med Libr Assoc. 1993; 81:299–305.
8. Vernon DT, Blake RL. Does problem based learning work? A meta-analysis of evaluative research. Acad Med. 1993; 68: 550–63.
9. Albanese MA, Mitchell S. Problem-based learning: a review of literature on its outcomes and implementation issues. Acad Med. 1993; 68:52–81.
10. Shin JH, Haynes RB, Johnston ME. Effect of problem based self-directed undergraduate education on life-long learning. Can Med Assoc J. 1993; 148: 969–76.
11. Herrnstein RJ, Murray C. The Bell Curve: Intelligence and Class Structure in American Life. New York: Free Press, 1994.
12. Campbell CM, Parboosingh JT, Gondocz ST, et al. Study of physicians' use of a software program to create a portfolio of their self-directed learning. Acad Med. 1996; 71: S49–S51.
13. Parboosingh JT, Gondocz ST. The Maintenance of Competence Program of the Royal College of Physicians and Surgeons of Canada. JAMA. 1993; 270: 1093.

Learning Styles

Or, How We Go From the Unknown To the Known

A learning style is a studentís consistent way of responding to and using stimuli in the context of learning. There are various instruments used to determine a student's learning style. The first style to be discussed is VAK (Visual, Auditory, Kinesthetic), which is derived from the accelerated learning world, and seems to be about the most popular model nowadays. Its main strength is that it is quite simple, which appeals to a lot of people. Its main weakness, is that the research does not really support it.

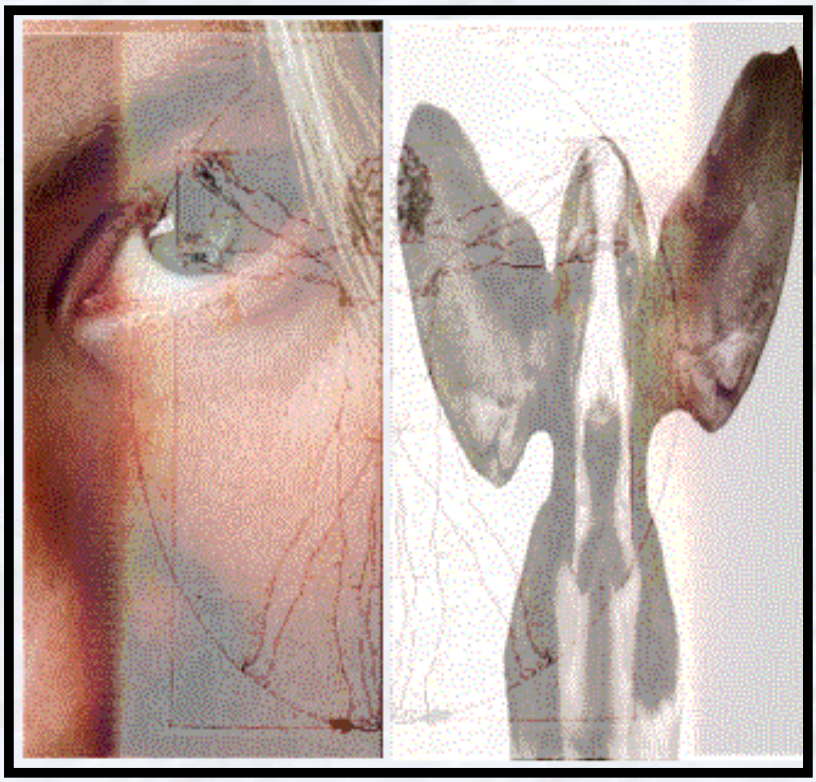
Kolb's learning inventory describes a learning process and a style, which makes it quite interesting. It can be thought of as a simpler version of the MBTI which is based upon determining the personality type. Kolb's version uses two dimensions, while the MBTI uses two similar dimensions, plus two additional ones.

Howard Gardner's Multiple Intelligences seems to provide the most promising outlook for diversifying learning.

WARNING: These various learning styles or intelligences are points along a scale that help us to discover the different forms of mental representation; they are not good characterizations of what people are (or are not) like. We should not divide the population into a set category (e.g. visual person, extrovert). What these various instruments are doing is allocating the person along some point on a continuum (similar to measuring height or weight). In other words, do not pigeon-hole people as we are all capable of learning under any style or intelligence no matter what our preference is.

VAK Learning Styles

The VAK learning Style uses the three main sensory receivers - Vision, Auditory, and Kinesthetic (movement) to determine the dominate learning style.



Learners use all three to receive information. However, one or more of these receiving styles is normally dominant. This dominant style defines the best way for a person to learn new information by filtering what is to be learned. This style may not always to be the same for some tasks. The learner may prefer one style of learning for one task, and a combination of others for another task.

Classically, our learning style is forced upon us through life like this: In grades kindergarten to third, new information is presented to us kinesthetically; grades 4 to 8 are visually presented; while grades 9 to college and on into the business learning environment, information is presented to us auditory by lectures.

As trainers, we need to present information using all three styles. This allows all learners, no matter what their preferred style is, the opportunity to become involved. It also allows a learner to be presented with the other two methods of reinforcement. Just because we prefer one style, does not mean that the other two do us no good. On the contrary, they help us to learn even faster by reinforcing the material. Some hints for recognizing and implementing the three styles are:

Auditory learners often talk to themselves. They also may move their lips and read out loud. They may have difficulty with reading and writing tasks. They often do better talking to a colleague or a tape recorder and hearing what was said. To

integrate this style into the learning environment:

- Begin new material with a brief explanation of what is coming. Conclude with a summary of what has been covered. This is the old adage of "tell them what they are going to lean, teach them, and tell them what they have learned."
- Use the Socratic method of lecturing by questioning learners to draw as much information from them as possible and then fill in the gaps with your own expertise.
- Include auditory activities, such as brainstorming, buzz groups, or Jeopardy.
- Leave plenty of time to debrief activities. This allows them to make connections of what they leaned and how it applies to their situation.
- Have the learners verbalize the questions.
- Develop an internal dialogue between yourself and the learners.

Visual learners have two subchannels - *linguistic* and *spatial*. Learners who are *visual-linguistic* like to learn through written language, such as reading and writing tasks. They remember what has been written down, even if they do not read it more than once. They like to write down directions and pay better attention to lectures if they watch them. Learners who are *visual-spatial* usually have difficulty with written language and do better with charts, demonstrations, videos, and other visual materials. They easily visualize faces and places by using their imagination and seldom get lost in new surroundings. To integrate this style into the learning environment:

- Use graphs, charts, illustrations, or other visual aids.
- Include outlines, agendas, handouts, etc. for reading and taking notes.
- Include plenty of content in handouts to reread after the learning session.
- Leave white space in handouts for note taking.
- Invite questions to help them stay alert in auditory environments.
- Post flip charts to show what will come and what has been presented.
- Emphasize key points to cue when to takes notes.
- Eliminate potential distractions.
- Supplement textual information with illustrations whenever possible.
- Have them draw pictures in the margins.
- Show diagrams and then explain them.
- Have the learners envision the topic or have them act out the subject matter.

Kinesthetic learners do best while touching and moving. It also has two subchannels - kinesthetic (movement) and tactile (touch) They tend to lose concentration if there is little or no external stimulation or movement. When listening to lectures they may want to take notes. When reading, they like to scan the material first, and then focus in on the details (get the big picture first). They typically use color highlighters and take notes by drawing pictures, diagrams, or doodling. To integrate this style into the learning environment:

- Use activities that get the learners up and moving.
- Play music, when appropriate, during activities.
- Use colored markers to emphasize key points on flipcharts or white boards.
- Give frequent stretch breaks (brain breaks).

- Provide toys such as Koosh balls and Play-Dough to give them something to do with their hands.
- To highlight a point, provide gum, candy, scents, etc. which provides a cross link of scent (aroma) to the topic at hand (scent can be a powerful cue).
- Provide highlighters, colored pens and/or pencils.
- Guide learners through a visualization of complex tasks.
- Have them transfer information from the text to another medium such as a keyboard or a tablet.

To assist in you in choosing your VAK preference, use the VAK Survey.

Carl Jung and Myers Briggs Type Indicator (MBTI)

During the early 1900s, Carl Jung established a field identifying distinct personality patterns. Many theorists have since broken these patterns into categories attempting to make them easier to understand. Carl Jung was a contemporary of Sigmund Freud and a leading exponent of Gestalt personality theory. Jung developed a ground-breaking personality theory that introduced two attitudes - extraversion and introversion (1933a). Later he described human behavior as a combination of four psychic functions - thinking/feeling and intuition/sensation (1933b). Thinking and feeling are said to be rational functions because they both require acts of judgments. Sensation and intuition involve immediate experiences. The MBTI, Kolb's *Learning Style Inventory*, *Managerial Grid*, and a number of other instruments all use a form of extraversion/introversion. His four other functions are also closely tied with these instruments.

The most widely used personality survey instrument is the Myers Briggs Type Indicator (MBTI), followed closely by the DiSC assessment (Carlson Learning). The MBTI can be an aid in understanding the individual differences. This is why it is more complicated than the other models discussed here, since they are strictly learning models why the MBTI is a personality model. However, our personality does play an important part in determining our learning style. And it does tie in within the other models so we will discuss its part in the the learning process.

Scores obtained from the MBTI indicate a person's preference on each of four dichotomous dimensions:

- Extroversion (E) versus Introversion (I) [similar to two dimensional behavioral models and Kolb's Learning Style Inventory]
- Sensing (S) versus iNtuition (N)

- Thinking (T) versus Feeling (F) [similar to two dimensional behavioral models and Kolb's Learning Style Inventory]
- Judging (J) versus Perceptive (P)

1. Extroversion (E) versus Introversion (I)

This indicates whether a learner prefers to direct attention towards the external world of people and things or toward the internal world of concepts and ideas. This preference tells us from where people get their energy.

Introverts find energy in the inner world of ideas, concepts, and abstractions. They can be sociable but need tranquility to regain their energy. They want to understand the world; they concentrate and the tend to be reflective thinkers. They think more than talk. Introverted learners want to develop frameworks that integrate or connect the information that they learn, this becomes knowledge is the interconnection of the material and to see a global view.

Extroverts find energy in things and people. They prefer interaction with others, and tend to be action-oriented. They also tend to think on their feet. They talk more than listen. Extroverted learners learn by teaching others. They do not normally understand the subject until they try to explain it to themselves or others (working in groups). Problem Based Learning and Collaborative Learning are good teaching techniques for this group.

2. Sensing (S) versus iNtuition (N)

This indicates whether a learner prefers to perceive the world by directly observing the surrounding reality or through impressions and imagining possibilities.

Sensing people choose to rely on their five senses. They are detail-oriented, they want facts, and they trust them. Sensing learners prefer organized, linear, and structured lectures (systematic instruction or step-by-step learning).

Intuitive people seek out patterns and relationships among the facts they have gathered. They trust hunches ("sixth" sense) and their intuition and look for the "big picture." They also value imagination and innovation. Intuitive learners prefer various forms of discovery learning and must have the big picture (metaphors and analogies), or an integrating framework in order to understand a subject. They like concept maps or and often compare and contrast tables.

3. Thinking (T) versus Feeling (F)

This indicates how the learner makes decisions, either through logic or by using fairness and human values.

Thinkers decide things impersonally based on analysis, logic, and principle. They

value fairness - focusing on the situation's logic, and placing great weight on objective criteria in making a decision. They naturally see flaws and tend to be critical. Thinking learners prefer clear goal and objectives. They want to see precise, action-oriented cognitive, affective and psychomotor objective. They also want to know what they have to do to learn the material.

Feelers value harmony by focusing on human values. They focus on human values and needs as they make decisions or arrive at judgments. They tend to be good at persuasion and facilitating differences among group members. They value empathy and harmony. Feeling learners enjoy the small group exercises, especially harmonious groups.

4. Judging (J) versus Perceptive (P)

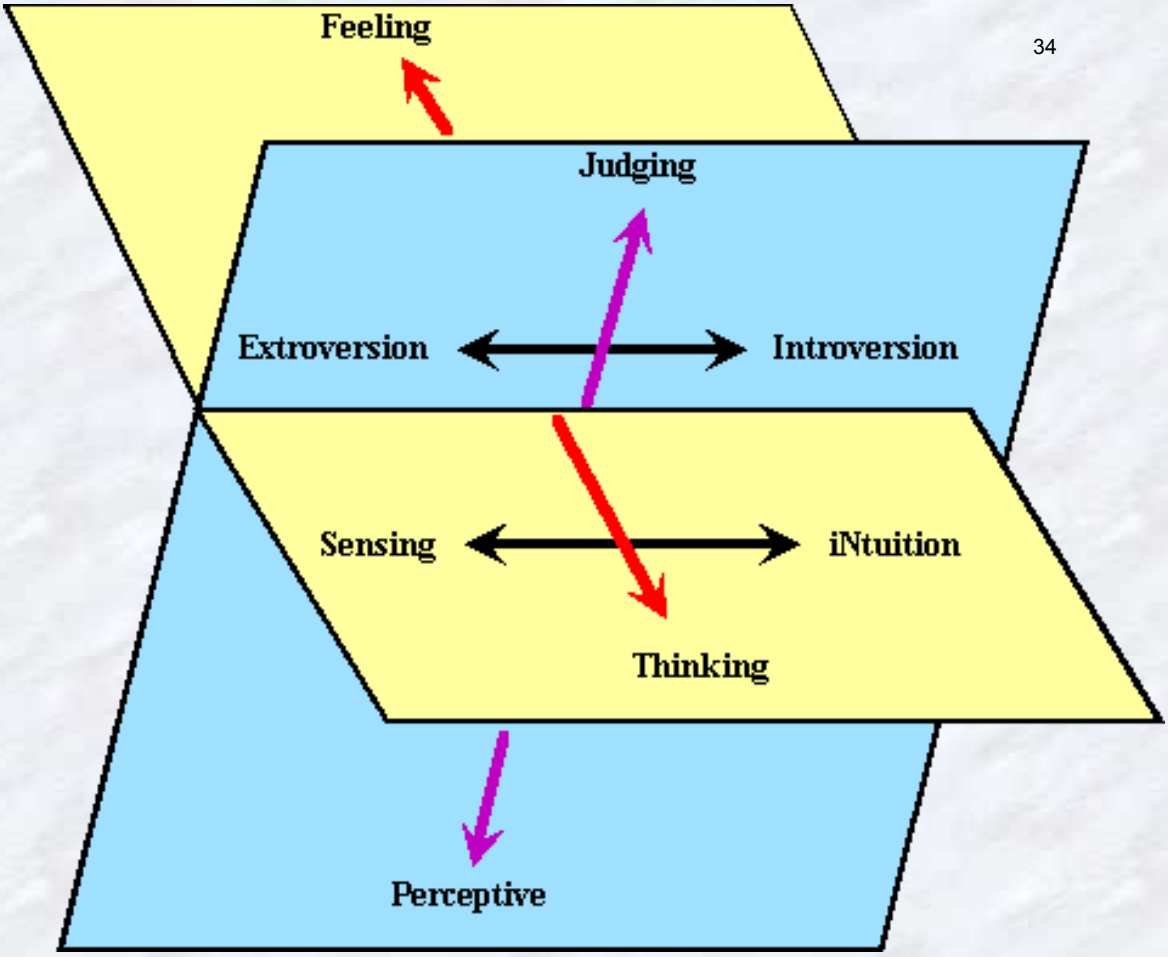
This indicates how the learner views the world, either as a structured and planned environment or as a spontaneous environment.

Judging people are decisive, self-starters and self-regimented. They also focus on completing the task, knowing the essentials, and they take action quickly. They plan their work and work their plan. Deadlines are sacred as they see time as a finite resource. Judging learners need tools that help them to plan their work and work their plan. They want guides that give quick tips. They can be encouraged by offering self-improvement.

Perceptive learners are curious, adaptable, and spontaneous. They start many tasks, want to know everything about each task, and often find it difficult to complete a task. Deadlines are meant to be stretched while more information is gathered as they see time as a renewable resource. They like to leave their options open. Perceptive learners often postpone doing an assignment until the last minute. They are not lazy, they are merely seeking information up to the very last minute. Breaking down a complex project into a series of sub-assignments and providing deadlines will keep perceptive learners on target. Also they are often process oriented (emphasis is on how the task is completed) and will easily adapt as long as they know the how.

MBTI Model

The MBTI model would have two dimensions - height and width, similar to Kolb's and other models, but it would also a third dimension - depth. Extroversion/ Introversion would be on the horizontal axis, while Feeling/Thinking would be on the vertical axis. This is represented by the model below.



MBTI Model

The depth (third dimension) of Extroversion/Introversion (EI) would be Judging/ Perceptive (JP). This might be thought of as how much time (JP) we are willing to stick to a task (EI) rather it be actively engaging in it or reflecting on it.

The depth (third dimension) of Feeling/Thinking (FT) would be Sensing/iNtuition (SN). This might be thought of as using our various senses, to include our "sixth sense" (SN) when thinking or feeling (FT) about a subject.

Multiple Intelligences

Howard Gardner theorized that there are multiple intelligences, and that we all use one or two for the most effective learning. Our culture teach, test, reinforce and reward primarily two kinds of intelligence: verbal/linguistic and logical/ mathematical. His theory proposes that there are at least eight other kinds of intelligence that are equally important. They are "languages" that most people speak, and that cut through cultural, educational, and ability differences.

The mind is not comprised of a single representation or a single language of representations. Rather, we harbor numerous internal representations in our minds. Some scholars speak of "modules of mind," some of a "society of mind," in this case it is "multiple intelligences." They include

"although they are not necessarily dependent on each other, these intelligences seldom operate in isolation. Every normal individual possesses varying degrees of each of these intelligences, but the ways in which intelligences combine and blend are as varied as the faces and the personalities of individuals." - Howard Gardner

- **Verbal Linguistic** intelligence (sensitive to the meaning and order of words as in a poet). Use activities that involve hearing, listening, impromptu or formal speaking, tongue twisters, humor, oral or silent reading, documentation, creative writing, spelling, journal, poetry.
- **Logical-mathematical** intelligence (able to handle chains of reasoning and recognize patterns and orders as in a scientist). Use activities that involve abstract symbols/formulas, outlining, graphic organizers, numeric sequences, calculation, deciphering codes, problem solving.
- **Musical** intelligence (sensitive to pitch, melody, rhythm, and tone as in a composer). Use activities that involve audio tape, music recitals, singing on key, whistling, humming, environmental sounds, percussion vibrations, rhythmic patterns, music composition, tonal patterns.
- **Spatial** intelligence (perceive the world accurately and try to re-create or transform aspects of that world as in a sculptor or airplane pilot). Use activities that involve art, pictures, sculpture, drawings, doodling, mind mapping, patterns/designs, color schemes, active imagination, imagery, block building.
- **Bodily Kinesthetic** intelligence (able to use the body skillfully and handle objects adroitly, as in an athlete or dancer). Use activities that involve role playing, physical gestures, drama, inventing, ball passing, sports games, physical exercise, body language, dancing.
- **Interpersonal** intelligence (understand people and relationship as in a salesman or teacher). learners think by bouncing ideas off of each other (socializers who are people smart). Use activities that involve group projects, division of labor, sensing others' motives, receiving/giving feedback, collaboration skills.
- **Intrapersonal** intelligence (possess access to one's emotional life as a means to understand oneself and others exhibited by individuals with accurate views of themselves). Use activities that involve emotional processing, silent reflection methods, thinking strategies, concentration skills, higher order reasoning, "centering" practices, meta-cognitive techniques.

- **Naturalist** (connected to the intricacies and subtleties in nature such as Charles Darwin and Meriwether Lewis of Lewis and Clark fame). Use activities that involve bringing the outdoors into the class, relating to the natural world, charting, mapping changes, observing wildlife, keeping journals or logs.

According to multiple intelligences theory, not only do all individuals possess numerous mental representations and intellectual languages, but individuals also differ from one another in the forms of these representations, their relative strengths, and the ways in which (and ease with which) these representations can be changed.

Putting the Styles Together

First, it should be noted that no single measurement of style ensures that a learner's needs will be met. It is perhaps more important to build an adaptable learning environment that presents the material in a variety of methods than try to determine each learners personal style. Likewise, recognizing your own style will help to ensure you do not unintentionally force one learning style upon the learners. The more styles you address, the easier the instruction will be received by the learners. This is because you will be striving to reach their needs, not yours. Also, material presented in a variety of methods keeps the learners interested and reinforces itself.

Learning styles come from three schools of thought: Perceptual Modality, Information Processing, and Personality Patterns (Conner & Hodgins, 2000).

Perceptual Modality are biologically-based reactions to the physical environment. It refers to the primary way our bodies take in information, such as auditory, visual, smell, kinesthetic, and tactile. Learning style:

- VAK - Notice that this style does not really worry about the why of learning styles.

Information Processing distinguishes between the way we think, solve problems, and remember information. This may be thought of as the way our brain processes information. Learning style:

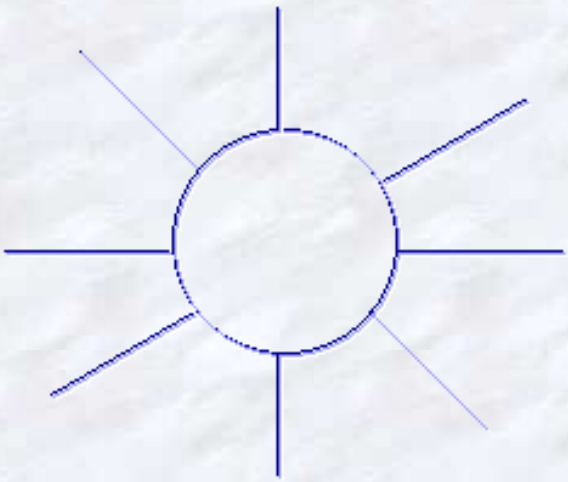
- The first part of Kolb's Learning Style Inventory in which he describes the process of learning.

Personality Models are the way we interact with our surroundings. Each of us has a preferred, consistent, distinct way of perceiving, organizing, and retaining information. This is due to the way we were brought up (environment or nurture) and the genes (DNA or nature) within us. This may be thought of as the ego within us, or what makes us what we are. Learning styles:

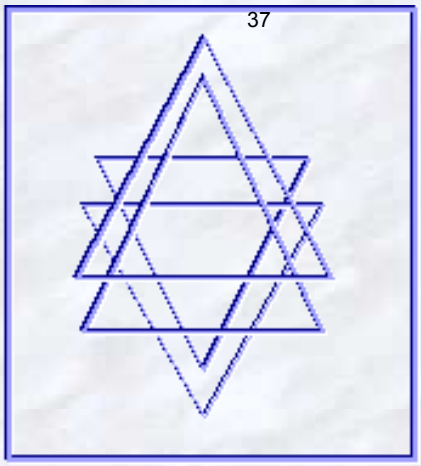
- The second part of Kolb's Learning Style Inventory in which he describes individual learning styles.
- MBTI.
- Howard Gardner's multiple intelligences.

All of these models can be thought of as a *Mandala* - a Sanskrit word for "magical circle." It is one of the oldest religious symbols and is found throughout the world. Although it is normally circular in appearance, it can take on a variety of forms.

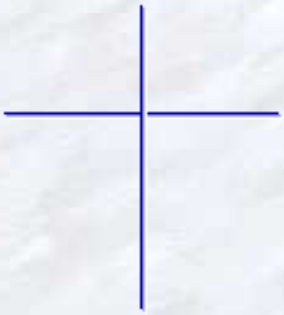
Yin and Yang



Sun Wheel



Sricakra of Tibet



Cross

Jung found the mandala symbol occurring spontaneously in the dreams and images of his patients. He thought of it as a symbol of wholeness that can aid us in integrating our personality. While several of the styles presented here are represented by various forms of crosses and circles, all the styles and models have one thing in common, they are an attempt to minimalize the complexity of an extremely multifaceted subject. It is only by slicing through behaviors one step at a time, such as how we learn through these simple models, will we ever have a chance of understanding our whole learning styles.

This is why these models do not fully explain how we learn and at the same time are both right and wrong. Learning is an extremely complex process. These models tend to simplify the process (which is a starting point in understanding a complex process). Also, each one tends to tackle something different in the learning environment by taking a small slice out of it. It is only by looking at these various slices and others will we ever begin to understand the whole learning process.

References

Conner, Marcia & Hodgins, Wayne (September 14, 2000). *Learning Styles* http://www.learnativity.com/learningstyles.html

Gardner, Howard (1993). *Frames of Mind: The Theory of Multiple Intelligences* (10th Anniversary Edition). NY: Basic Books.

Jung, C. G. (1933). *Psychological Types*. New York: Harcourt, Brace.

Jung, C. G. (1933). *Modern Man In Search of A Soul*. New York: Harcourt, Brace.

Rose, Colin (1985). *Accelerated Learning*. New York: Dell.

Schroeder, Charles, C. (1997). *New Students - New Learning Styles*. On-line: http://www.virtualschool.edu/mon/Academia/KierseyLearningStyles.html or http://www.virtualschool.edu/mon.

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http://www.nwlink.com/~donclark/hrd/learning/styles.html

Active Learning

What Is Active Learning?

Active learning happens when students are given the opportunity to take a more interactive relationship with the subject matter of a course, encouraging them to generate rather than simply to receive knowledge. In an active learning environment, teachers facilitate rather than dictate the students' learning.

Why Active Learning?

Research has shown that active learning is an exceptionally effective teaching technique. Regardless of the subject matter, when active learning is compared to traditional teaching methods (such as lecture), students learn more material, retain the information longer, and enjoy the class more. Active learning allows students to learn in the classroom with the help of the instructor and other students, rather than on their own.

How To Incorporate Active Learning Into Your Classroom

Employing active learning techniques in the classroom can pose difficulties to teachers and students not accustomed to this mode of instruction. The teacher surrenders some of the control of the class as s/he becomes a facilitator, and the students take increased responsibility for not only *what* but also *how* they learn. Incorporating active learning in the classroom, then, requires students to act. Try using the following techniques to offer your students the opportunity to participate actively in their learning.

Think-pair-share is a simple activity you can use in any classroom format. Give students time to think about a topic, turn to their neighbor for a short discussion, and then share the results with the rest of the class.

Minute Papers provide students with the opportunity to synthesize their knowledge and to ask unanswered questions. Give students a few minutes at the end of class to answer the following questions in writing: What was the most important thing you learned today? What important question remains unanswered? Variations of these questions, and the student questions and answers they generate, enhance your students' learning process and provide you with feedback on students' understanding of the subject material.

Writing activities of many kinds offer students the opportunity to think about and process information. For example, in addition to minute papers, you could pose a question and then give students time to **freewrite** their answers. You could also give students time to freewrite about topics.

Brainstorming is another simple technique that can involve the whole class in a discussion. Introduce a topic or problem and then ask for student input, which you record on the board.

Games related to the subject can easily be incorporated into the classroom to foster active learning and participation. Games can include matching, mysteries, group competitions, solving puzzles, pictionary, etc.

Debates staged in class can be effective tools for encouraging students to think about several sides of an issue.

Group work allows every participant the chance to speak, share personal views, and develop the skill of working with others. Cooperative group work requires all group members to work together to complete a given task. Break the class into groups of 2-5 students. Give each group articles to read, questions to answer and discuss, information to share, subjects to teach to other groups, etc.

Case studies use real-life stories that describe what happened to a community, family, school, or individual to prompt students to integrate their classroom knowledge with their knowledge of real-world situations, actions, and consequences.

FOR MORE INFORMATION…

Each website offers additional information on active learning, including more extensive definitions, further explanation of its benefits in the classroom, and more tips on how to incorporate active learning into your teaching.

Active Learning: Creating Excitement in the Classroom. The National Teaching & Learning Forum.
http://www.ntlf.com/html/lib/bib/91-9dig.htm

What is Active Learning? Buffalo University Teaching Resources.
http://icarus.ubetc.buffalo.edu/etc/tlr/whatis.html

Active Learning Strategies. National Training Partnership.
http://www2.edc.org/NTP/trainingdesign_activelearningstrategies.htm

Teaching and Learning Methods and Strategies. University of Arizona
http://www.u.arizona.edu/ic/edtech/strategy.html

Active Learning Online
http://www.acu.edu/cte/activelearning/classroom_main.htm

Active Learning and Library Instruction. Michigan State University
http://www.libraryreference.org/activebi.html

Active Learning Strategies. Summaries of Best Practices in College Teaching.
http://northonline.sccd.ctc.edu/eceprog/bstprac.html#active

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BACKGROUND & DEFINITIONS

The past decade has seen an explosion of interest among college faculty in the teaching methods variously grouped under the terms 'active learning' and 'cooperative learning'. However, even with this interest, there remains much misunderstanding of and mistrust of the pedagogical "movement" behind the words. The majority of all college faculty still teach their classes in the traditional lecture mode. Some of the criticism and hesitation seems to originate in the idea that techniques of active and cooperative learning are genuine alternatives to, rather than enhancements of, professors' lectures. We provide below a survey of a wide variety of active learning techniques which can be used to supplement rather than replace lectures. We are not advocating complete abandonment of lecturing, as both of us still lecture about half of the class period. The lecture is a very efficient way to present information but use of the lecture as the only mode of instruction presents problems for both the instructor and the students. There is a large amount of research attesting to the benefits of active learning.

"Active Learning" is, in short, anything that students do in a classroom other than merely passively listening to an instructor's lecture. This includes everything from listening practices which help the students to absorb what they hear, to short writing exercises in which students react to lecture material, to complex group exercises in which students apply course material to "real life" situations and/or to new problems. The term "cooperative learning" covers the subset of active learning activities which students do as groups of three or more, rather than alone or in pairs; generally, cooperative learning techniques employ more formally structured groups of students assigned complex tasks, such as multiple-step exercises, research projects, or presentations. Cooperative learning is to be distinguished from another now well-defined term of art, "collaborative learning", which refers to those classroom strategies which have the instructor and the students placed on an equal footing working together in, for example, designing assignments, choosing texts, and presenting material to the class. Clearly, collaborative learning is a more radical departure from tradition than merely utilizing techniques aimed at enhancing student retention of material presented by the instructor; we will limit our examples to the "less radical" active and cooperative learning techniques. "Techniques of active learning", then, are those activities which an instructor incorporates into the classroom to foster active learning.

TECHNIQUES OF ACTIVE LEARNING

Exercises for Individual Students

Because these techniques are aimed at individual students, they can very easily be used without interrupting the flow of the class. These exercises are particularly useful in providing the instructor with feedback concerning student understanding and retention of material. Some (numbers 3 and 4, in particular) are especially designed to encourage students' exploration of their own attitudes and values. Many (especially numbers 4 - 6) are designed to increase retention of material presented in lectures and texts.

1. **The "One Minute Paper"** - This is a highly effective technique for checking student progress, both in understanding the material and in reacting to course material. Ask students to take out a blank sheet of paper, pose a question (either specific or open-ended), and give them one (or perhaps two - but not many more) minute(s) to respond. Some sample questions include: "How does John Hospers define "free will"?", "What is "scientific realism"?", "What is the activation energy for a chemical reaction?", "What is the difference between replication and transcription?", and so on. Another good use of the minute paper is to ask questions like "What was the main point of today's class material?" This tells you whether or not the students are viewing the material in the way you envisioned.

2. **Muddiest (or Clearest) Point** - This is a variation on the one-minute paper, though you may wish to give students a slightly longer time period to answer the question. Here you ask (at the end of a class period, or at a natural break in the presentation), "What was the "muddiest point" in today's lecture?" or, perhaps, you might be more specific, asking, for example: "What (if anything) do you find unclear about the concept of 'personal identity' ('inertia', 'natural selection', etc.)?".

3. **Affective Response** - Again, this is similar to the above exercises, but here you are asking students to report their reactions to some facet of the course material - i.e., to provide an emotional or valuative response to the material. Obviously, this approach is limited to those subject areas in which such questions are appropriate (one should not, for instance, inquire into students' affective responses to vertebrate taxonomy). However, it can be quite a useful starting point for courses such as applied ethics, particularly as a precursor to theoretical analysis. For example, you might ask students what they think of Dr. Jack Kevorkian's activities, before presenting what various moral theorists would make of them. By having several views "on the table" before theory is presented, you can help students to see the material in context and to explore their own beliefs. It is also a good way to begin a discussion of evolutionary theory or any other scientific area where the general public often has views contrary to current scientific thinking, such as paper vs. plastic packaging or nuclear power generation.

4. **Daily Journal** - This combines the advantages of the above three techniques, and allows for

more in-depth discussion of or reaction to course material. You may set aside class time for students to complete their journal entries, or assign this as homework. The only disadvantage to this approach is that the feedback will not be as "instant" as with the one-minute paper (and other assignments which you collect the day of the relevant lecture). But with this approach (particularly if entries are assigned for homework), you may ask more complex questions, such as, "Do you think that determinism is correct, or that humans have free will? Explain your answer.", or "Do you think that Dr. Kevorkian's actions are morally right? What would John Stuart Mill say?" and so on. Or you might have students find and discuss reports of scientific studies in popular media on topics relevant to course material, such as global warming, the ozone layer, and so forth.

5. **Reading Quiz** - Clearly, this is one way to coerce students to read assigned material! Active learning depends upon students coming to class prepared. The reading quiz can also be used as an effective measure of student comprehension of the readings (so that you may gauge their level of sophistication as readers). Further, by asking the same sorts of questions on several reading quizzes, you will give students guidance as to what to look for when reading assigned text. If you ask questions like "What color were Esmerelda's eyes?" (as my high school literature teacher liked to do), you are telling the student that it is the details that count, whereas questions like "What reason did Esmerelda give, for murdering Sebastian?" highlight issues of justification. If your goal is to instruct (and not merely to coerce), carefully choose questions which will both identify who has read the material (for your sake) and identify what is important in the reading (for their sake).

6. **Clarification Pauses** - This is a simple technique aimed at fostering "active listening". Throughout a lecture, particularly after stating an important point or defining a key concept, stop, let it sink in, and then (after waiting a bit!) ask if anyone needs to have it clarified. You can also circulate around the room during these pauses to look at student notes, answer questions, etc. Students who would never ask a question in front of the whole class will ask questions during a clarification pause as you move about the room.

7. **Response to a demonstration or other teacher centered activity** - The students are asked to write a paragraph that begins with: I was surprised that ... I learned that ... I wonder about ... This allows the students to reflect on what they actually got out of the teachers' presentation. It also helps students realize that the activity was designed for more than just entertainment.

Questions and Answers

While most of us use questions as a way of prodding students and instantly testing comprehension, there are simple ways of tweaking our questioning techniques which increase student involvement and comprehension. Though some of the techniques listed here are "obvious", we will proceed on the principle that the obvious sometimes bears repeating (a useful pedagogical principle, to be sure!).

The "Socratic Method"

Taking its namesake from the most famous gadfly in history, this technique in its original format involved instructors "testing" student knowledge (of reading assignments, lectures, or perhaps applications of course material to a wider context) by asking questions during the course of a lecture. Typically, the instructor chooses a particular student, presents her with a question, and expects an answer forthwith; if the "chosen" student cannot answer the question presented, the instructor chooses another (and another) until the desired answer is received. This method has come under criticism, based on claims that it singles out students (potentially embarrassing them), and/or that it favors only a small segment of the class (i.e., that small percentage of the class who can answer any question thrown at them). In addition, once a student has answered a question they may not pay much attention as it will be a long time before the teacher returns to them for a second question. In spite of these criticisms, we feel that the Socratic method is an important and useful one; the following techniques suggest variations which enhance this method, avoiding some of these pitfalls.

8. **Wait Time** - Rather than choosing the student who will answer the question presented, this variation has the instructor WAITING before calling on someone to answer it. The wait time will generally be short (15 seconds or so) - but it may seem interminable in the classroom. It is important to insist that no one raise his hand (or shout out the answer) before you give the OK, in order to discourage the typical scenario in which the five students in the front row all immediately volunteer to answer the question, and everyone else sighs in relief. Waiting forces every student to think about the question, rather than passively relying on those students who are fastest out of the gate to answer every question. When the wait time is up, the instructor asks for volunteers or randomly picks a student to answer the question. Once students are in the habit of waiting after questions are asked, more will get involved in the process.

9. **Student Summary of Another Student's Answer** - In order to promote active listening, after one student has volunteered an answer to your question, ask another student to summarize the first student's response. Many students hear little of what their classmates have to say, waiting instead for the instructor to either correct or repeat the answer. Having students summarize or repeat each others' contributions to the course both fosters active participation by all students and promotes the idea that learning is a shared enterprise. Given the possibility of being asked to repeat a classmates' comments, most students will listen more attentively to each other.

10. **The Fish Bowl** - Students are given index cards, and asked to write down one question concerning the course material. They should be directed to ask a question of clarification regarding some aspect of the material which they do not fully understand; or, perhaps you may allow questions concerning the application of course material to practical contexts. At the end of the class period (or, at the beginning of the next class meeting if the question is assigned for homework), students deposit their questions in a fish bowl. The instructor then draws several questions out of the bowl and answers them for the class or asks the class to answer them. This

technique can be combined with others (e.g., #8-9 above, and #2).

11. **Quiz/Test Questions** - Here students are asked to become actively involved in creating quizzes and tests by constructing some (or all) of the questions for the exams. This exercise may be assigned for homework and itself evaluated (perhaps for extra credit points). In asking students to think up exam questions, we encourage them to think more deeply about the course material and to explore major themes, comparison of views presented, applications, and other higher-order thinking skills. Once suggested questions are collected, the instructor may use them as the basis of review sessions, and/or to model the most effective questions. Further, you may ask students to discuss the merits of a sample of questions submitted; in discussing questions, they will significantly increase their engagement of the material to supply answers. Students might be asked to discuss several aspects of two different questions on the same material including degree of difficulty, effectiveness in assessing their learning, proper scope of questions, and so forth.

Immediate Feedback

These techniques are designed to give the instructor some indication of student understanding of the material presented during the lecture itself. These activities provide formative assessment rather than summative assessment of student understanding, Formative assessment is evaluation of the class as a whole in order to provide information for the benefit of the students and the instructor, but the information is not used as part of the course grade; summative assessment is any evaluation of student performance which becomes part of the course grade. For each feedback method, the instructor stops at appropriate points to give quick tests of the material; in this way, she can adjust the lecture mid-course, slowing down to spend more time on the concepts students are having difficulty with or moving more quickly to applications of concepts of which students have a good understanding.

12. **Finger Signals** - This method provides instructors with a means of testing student comprehension without the waiting period or the grading time required for written quizzes. Students are asked questions and instructed to signal their answers by holding up the appropriate number of fingers immediately in front of their torsos (this makes it impossible for students to "copy", thus committing them to answer each question on their own). For example, the instructor might say "one finger for 'yes', two for 'no'", and then ask questions such as "Do all organic compounds contain carbon [hydrogen, etc.]?". Or, the instructor might have multiple choice questions prepared for the overhead projector and have the answers numbered (1) through (5), asking students to answer with finger signals. In very large classes the students can use a set of large cardboard signs with numbers written on them. This method allows instructors to assess student knowledge literally at a glance.

13. **Flash Cards** - A variation of the Finger Signals approach, this method tests students' comprehension through their response to flash cards held by the instructor. This is particularly

useful in disciplines which utilize models or other visual stimuli, such as chemistry, physics or biology. For example, the instructor might flash the diagram of a chemical compound and ask "Does this compound react with H_2O?". This can be combined with finger signals.

14. **Quotations** - This is a particularly useful method of testing student understanding when they are learning to read texts and identify an author's viewpoint and arguments. After students have read a representative advocate of each of several opposing theories or schools of thought, and the relevant concepts have been defined and discussed in class, put on the overhead projector a quotation by an author whom they have not read in the assigned materials, and ask them to figure out what position that person advocates. In addition to testing comprehension of the material presented in lecture, this exercise develops critical thinking and analysis skills. This would be very useful, for example, in discussing the various aspects of evolutionary theory.

Critical Thinking Motivators

Sometimes it is helpful to get students involved in discussion of or thinking about course material either before any theory is presented in lecture or after several conflicting theories have been presented. The idea in the first case is to generate data or questions prior to mapping out the theoretical landscape; in the second case, the students learn to assess the relative merits of several approaches.

15. **The Pre-Theoretic Intuitions Quiz** - Students often dutifully record everything the instructor says during a lecture and then ask at the end of the day or the course "what use is any of this?", or "what good will philosophy [organic chemistry, etc.] do for us?". To avoid such questions, and to get students interested in a topic before lectures begin, an instructor can give a quiz aimed at getting students to both identify and to assess their own views. An example of this is a long "True or False" questionnaire designed to start students thinking about moral theory (to be administered on the first or second day of an introductory ethics course), which includes statements such as "There are really no correct answers to moral questions" and "Whatever a society holds to be morally right is in fact morally right". After students have responded to the questions individually, have them compare answers in pairs or small groups and discuss the ones on which they disagree. This technique may also be used to assess student knowledge of the subject matter in a pre-/post-lecture comparison. The well-known "Force Concept Inventory" developed by Hestenes to measure understanding of force and motion is another good example of this.

16. **Puzzles/Paradoxes** - One of the most useful means of ferreting out students' intuitions on a given topic is to present them with a paradox or a puzzle involving the concept(s) at issue, and to have them struggle towards a solution. By forcing the students to "work it out" without some authority's solution, you increase the likelihood that they will be able to critically assess theories when they are presented later. For example, students in a course on theories of truth might be asked to assess the infamous "Liar Paradox" (with instances such as 'This sentence is false'), and

to suggest ways in which such paradoxes can be avoided. Introductory logic students might be presented with complex logic puzzles as a way of motivating truth tables, and so forth. In scientific fields you can present experimental data which seems to contradict parts of the theory just presented or use examples which seem to have features which support two opposing theories.

Share/Pair

Grouping students in pairs allows many of the advantages of group work students have the opportunity to state their own views, to hear from others, to hone their argumentative skills, and so forth without the administrative "costs" of group work (time spent assigning people to groups, class time used just for "getting in groups", and so on). Further, pairs make it virtually impossible for students to avoid participating thus making each person accountable.

17. **Discussion** - Students are asked to pair off and to respond to a question either in turn or as a pair. This can easily be combined with other techniques such as those under "Questions and Answers" or "Critical Thinking Motivators" above. For example, after students have responded to statements, such as "Whatever a society holds to be morally right is in fact morally right" with 'true' or 'false', they can be asked to compare answers to a limited number of questions and to discuss the statements on which they differed. In science classes students can be asked to explain some experimental data that supports a theory just discussed by the lecturer. Generally, this works best when students are given explicit directions, such as "Tell each other why you chose the answer you did".

18. **Note Comparison/Sharing** - One reason that some students perform poorly in classes is that they often do not have good note-taking skills. That is, while they might listen attentively, students do not always know what to write down, or they may have gaps in their notes which will leave them bewildered when they go back to the notes to study or to write a paper. One way to avoid some of these pitfalls and to have students model good note-taking is to have them occasionally compare notes. The instructor might stop lecturing immediately after covering a crucial concept and have students read each others' notes, filling in the gaps in their own note-taking. This is especially useful in introductory courses or in courses designed for non-majors or special admissions students. Once students see the value of supplementing their own note-taking with others', they are likely to continue the practice outside of class time.

19. **Evaluation of Another Student's Work** - Students are asked to complete an individual homework assignment or short paper. On the day the assignment is due, students submit one copy to the instructor to be graded and one copy to their partner. These may be assigned that day, or students may be assigned partners to work with throughout the term. Each student then takes their partner's work and depending on the nature of the assignment gives critical feedback, standardizes or assesses the arguments, corrects mistakes in problem-solving or grammar, and so forth. This is a particularly effective way to improve student writing.

Cooperative Learning Exercises

For more complex projects, where many heads are better than one or two, you may want to have students work in groups of three or more. As the term "cooperative learning" suggests, students working in groups will help each other to learn. Generally, it is better to form heterogeneous groups (with regard to gender, ethnicity, and academic performance), particularly when the groups will be working together over time or on complex projects; however, some of these techniques work well with spontaneously formed groups. Cooperative groups encourage discussion of problem solving techniques ("Should we try this?", etc.), and avoid the embarrassment of students who have not yet mastered all of the skills required.

20. **Cooperative Groups in Class -** Pose a question to be worked on in each cooperative group and then circulate around the room answering questions, asking further questions, keeping the groups on task, and so forth.. After an appropriate time for group discussion, students are asked to share their discussion points with the rest of the class. (The ensuing discussion can be guided according to the "Questions and Answers" techniques outlined above.)

21. **Active Review Sessions** - In the traditional class review session the students ask questions and the instructor answers them. Students spend their time copying down answers rather than thinking about the material. In an active review session the instructor posses questions and the students work on them in groups. Then students are asked to show their solutions to the whole group and discuss any differences among solutions proposed.

22. **Work at the Blackboard** - In many problem solving courses (e.g., logic or critical thinking), instructors tend to review homework or teach problem solving techniques by solving the problems themselves. Because students learn more by doing, rather than watching, this is probably not the optimal scenario. Rather than illustrating problem solving, have students work out the problems themselves, by asking them to go to the blackboard in small groups to solve problems. If there is insufficient blackboard space, students can still work out problems as a group, using paper and pencil or computers if appropriate software is available.

23. **Concept Mapping** - A concept map is a way of illustrating the connections that exist between terms or concepts covered in course material; students construct concept maps by connecting individual terms by lines which indicate the relationship between each set of connected terms. Most of the terms in a concept map have multiple connections. Developing a concept map requires the students to identify and organize information and to establish meaningful relationships between the pieces of information.

24. **Visual Lists** - Here students are asked to make a list--on paper or on the blackboard; by working in groups, students typically can generate more comprehensive lists than they might if working alone. This method is particularly effective when students are asked to compare views or to list

pros and cons of a position. One technique which works well with such comparisons is to have students draw a "T" and to label the left- and right-hand sides of the cross bar with the opposing positions (or 'Pro' and 'Con'). They then list everything they can think of which supports these positions on the relevant side of the vertical line. Once they have generated as thorough a list as they can, ask them to analyze the lists with questions appropriate to the exercise. For example, when discussing Utilitarianism (a theory which claims that an action is morally right whenever it results in more benefits than harms) students can use the "T" method to list all of the (potential) benefits and harms of an action, and then discuss which side is more heavily "weighted". Often having the list before them helps to determine the ultimate utility of the action, and the requirement to fill in the "T" generally results in a more thorough accounting of the consequences of the action in question. In science classes this would work well with such topics as massive vaccination programs, nuclear power, eliminating chlorofluorocarbons, reducing carbon dioxide emissions, and so forth.

25. **Jigsaw Group Projects** - In jigsaw projects, each member of a group is asked to complete some discrete part of an assignment; when every member has completed his assigned task, the pieces can be joined together to form a finished project. For example, students in a course in African geography might be grouped and each assigned a country; individual students in the group could then be assigned to research the economy, political structure, ethnic makeup, terrain and climate, or folklore of the assigned country. When each student has completed his research, the group then reforms to complete a comprehensive report. In a chemistry course each student group could research a different form of power generation (nuclear, fossil fuel, hydroelectric, etc.). Then the groups are reformed so that each group has an expert in one form of power generation. They then tackle the difficult problem of how much emphasis should be placed on each method.

26. **Role Playing** - Here students are asked to "act out" a part. In doing so, they get a better idea of the concepts and theories being discussed. Role-playing exercises can range from the simple (e. g., "What would you do if a Nazi came to your door, and you were hiding a Jewish family in the attic?") to the complex. Complex role playing might take the form of a play (depending on time and resources); for example, students studying ancient philosophy might be asked to recreate the trial of Socrates. Using various sources (e.g., Plato's dialogues, Stone's The Trial of Socrates, and Aristophanes' The Clouds), student teams can prepare the prosecution and defense of Socrates on the charges of corruption of youth and treason; each team may present witnesses (limited to characters which appear in the Dialogues, for instance) to construct their case, and prepare questions for cross-examination.

27. **Panel Discussions** - Panel discussions are especially useful when students are asked to give class presentations or reports as a way of including the entire class in the presentation. Student groups are assigned a topic to research and asked to prepare presentations (note that this may readily be combined with the jigsaw method outlined above). Each panelist is then expected to make a very short presentation, before the floor is opened to questions from "the audience". The key to success is to choose topics carefully and to give students sufficient direction to ensure that they are well-prepared for their presentations. You might also want to prepare the "audience", by

assigning them various roles. For example, if students are presenting the results of their research into several forms of energy, you might have some of the other students role play as concerned environmentalists, transportation officials, commuters, and so forth.

28. **Debates** - Actually a variation of #27, formal debates provide an efficient structure for class presentations when the subject matter easily divides into opposing views or 'Pro'/'Con' considerations. Students are assigned to debate teams, given a position to defend, and then asked to present arguments in support of their position on the presentation day. The opposing team should be given an opportunity to rebut the argument(s) and, time permitting, the original presenters asked to respond to the rebuttal. This format is particularly useful in developing argumentation skills (in addition to teaching content).

29. **Games** - Many will scoff at the idea that one would literally play games in a university setting, but occasionally there is no better instructional tool. In particular, there are some concepts or theories which are more easily illustrated than discussed and in these cases, a well-conceived game may convey the idea more readily. For example, when students are introduced to the concepts of "laws of nature" and "the scientific method", it is hard to convey through lectures the nature of scientific work and the fallibility of inductive hypotheses. Instead, students play a couple rounds of the Induction Game, in which playing cards are turned up and either added to a running series or discarded according to the dealer's pre-conceived "law of nature". Students are asked to "discover" the natural law, by formulating and testing hypotheses as the game proceeds.

REFERENCES ON ACTIVE AND COOPERATIVE LEARNING

Angelo, T. A. and Cross, K. P. 1993. *Classroom Assessment Techniques, A Handbook for College Teachers*, 2nd ed., Jossey-Bass Publishers, San Francisco,.

Bonwell, C.C, and J. A. Eison. 1991. *Active Learning: Creating Excitement in the Classroom*. (ASHE-ERIC Higher Education Report No. 1, 1991) Washington, D.C.: George Washington University Clearinghouse on Higher Education.

Brophy, J. 1987. Synthesis of research on strategies for motivating students to learn. *Educational Leadership* 45: 40-48.

Clarke, J. 1994. "Pieces of the Puzzle: The Jigsaw Method", in Sharan, ed. *Handbook of Cooperative Learning Methods.*

Davis, G. 1993. *Tools for Teaching*, Jossey-Bass Publishers, San Francisco.

Davis, T. M. and Murrell, P. H. 1993. *Turning Teaching into Learning: The Role of Student Responsibility in the Collegiate Experience*, ASHE-ERIC Higher Education Research Report, No. 1, Washington, D.C.

Crow, L. W., Ed. 1989. *Enhancing Critical Thinking in the Sciences*, Society for College Science Teachers, Washington, D. C.

Frederick, Peter J. 1987. "Student Involvement: Active Learning in Large Classes", in M. Weimer, ed. *Teaching Large Classes Well*. pp. 45-56.

Goodsell, A., M. Maher and V. Tinto. 1992. *Collaborative Learning: A Sourcebook for Higher Education.* University Park: The National Center on Postsecondary Teaching, Learning, and Assessment.

Grasha, A. 1996.*Teaching with Style*, Alliance Publishers, Pittsburgh, PA.

Herron, D. 1996.*The Chemistry Classroom, Formulas for Successful Teaching*, American Chemical Society, Washington, D. C.

Johnson, D. and R. Johnson. 1994. "Structuring Academic Controversy", in Sharan, ed. *Handbook of Cooperative Learning Methods.*

Johnson, D., R. Johnson, and K. Smith. 1991*. Active Learning: Cooperation in the College Classroom*. Edina, MI, Interaction Book Company.

----------. 1991. *Cooperative Learning: Increasing College Faculty Instructional Productivity.* (ASHE-ERIC Higher Education Report No. 4, 1991) Washington, D.C.: George Washington University Clearing House on Higher Education.

Kagan, S. 1992. *Cooperative Learning*. San Juan Capistrano, CA: Resources for Teachers, Inc.

Kagan, S. and M. Kagan. 1994. "The Structural Approach: Six Keys to Cooperative Learning", in Sharan, ed. *Handbook of Cooperative Learning Methods*.

Lowman. 1995.*Mastering the Techniques of Teaching*, 3rd. Ed. Jossey-Bass, San Francisco.

Marcus, Russell. 1998. "Cooperative Learning on the First Day of Class", *APA Newsletters*, 97:2, Spring. [note: also forthcoming in *Teaching Philosophy*]

Mazur, E. 1996.*Conceptests*, Prentice-Hall, Englewood Cliffs, N. J.

Meyers, C. and T. Jones. 1993*. Promoting Active Learning: Strategies for the College Classroom.* San Francisco: Jossey-Bass.

McKinney, K., and M. Graham-Buxton. 1993. "The Use of Collaborative Learning Groups in the Large Class: Is It Possible?" *Teaching Sociology*, 21, 403-408.

Morrissey, T. J. 1982. *The Five-Minute Entry: A Writing Exercise for Large Classes in All Disciplines*. Exercise Exchange, 27, 41-42. (ERIC Document Reproduction Service No. ED 236 604)

National Research Council. 1997.*Science Teaching Reconsidered*, National Academy Press, Washington, D. C.

Nelson, C. T. "Tools for Tampering with Teaching's Taboos," in *New Paradigms for College Teaching*, W. E. Campbell and K. A. Smith, Eds., Interaction Book Company, Edina, MI, 1997.

New Paradigms for College Teaching, Campbell, D. E.; Smith, K. A. Editors, Interaction Book Co., Edina, MI, 1997

Siebert, E. D. ; Caprio, M. W.; Lyda C. M., Ed. 1997.*Effective Teaching and Course Management for University and College Teachers*, Kendall-Hunt Publishing, Dubuque, Iowa.

Silberman, M. 1996.*Active Learning*, Allyn and Bacon, Boston.

Sharan, S., ed. 1994. *Handbook of Cooperative Learning Methods*. Westport, CT: Greenwood Press.

Weimer, M. G., ed. 1987. *Teaching Large Classes Well*. San Francisco: Jossey-Bass.

INTERNET REFERENCES

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Active Learning: Creating Excitement in the Classroom

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PREFACE

Thirty years ago, McKeachie wrote in the *Handbook of Research on Teaching* (Gage, 1963, P. 1125), "College teaching and lecturing have been so long associated that when one pictures a college professor in a classroom, he almost inevitably pictures him as lecturing." Few would argue with the statement that the vast majority of today's professoriate were primarily lectured to as both undergraduates and as graduate school students. It is not surprising, therefore, that lecturing continues to be our most prevalent mode of instruction.

A host of national reports in the 1980's, however, challenged college and university faculty to develop instructional approaches that transform students from passive listeners to active learners. On first glance, like many of the recommendations provided by "blue ribbon panels," this would seem "easier said than done."

The incorporation of active learning strategies into the daily routine of classroom instruction can, and should, be done. To help in this pursuit, this workshop will engage participants in specific, practical teaching strategies designed to model the use of active learning in the classroom. The handout summarizes the workshop's content and identifies resources for further study.

CONTENTS

WORKSHOP NOTES

Active Learning

I. In the context of the college classroom, what are the major characteristics associated with active learning?

A. Some of the major characteristics associated with active learning strategies include:

1. Students are involved in more than passive listening

2. Students are engaged in activities (e.g., reading, discussing, writing)

3. There is less emphasis placed on information transmission and greater emphasis placed on developing student skills

4. There is greater emphasis placed on the exploration of attitudes and values

5. Student motivation is increased (especially for adult learners)

6. Students can receive immediate feedback from their instructor

7. Students are involved in higher order thinking (analysis, synthesis, evaluation)

B. In summary, *in the context of the college classroom, active learning involves students in doing things and thinking about the things they are doing.*

C. A conceptual framework encompassing active learning might be a continuum that moves from simple tasks on one end to complex tasks on the other. This is, of course, an artificial, oversimplified construct, but it does provide both a visual and conceptual model that is useful for designing courses that maximize students' intellectual engagement. Neither end of the continuum is considered to be "better" or more "desirable" than the other. Simple tasks are defined as short and relatively unstructured, while complex tasks are of longer duration-- perhaps the whole class period or longer-- and are carefully planned and structured.

Figure 1

Simple tasks ---------- Complex tasks

The Active Learning Continuum

II. Why is active learning important?

A. The amount of information retained by students declines substantially after ten minutes (Thomas, 1972).

B. Research comparing lecture versus discussion techniques was summarized in the report *Teaching and Learning in the Classroom: A Review of the Research Literature* prepared by the National Center for Research to Improve Postsecondary Teaching and Learning (McKeachie, et. al., 1987). The review concluded that

> In those experiments involving measures of retention of information after the end of a course, measures of problem solving, thinking, attitude change, or motivation for further learning, the results tend to show differences favoring discussion methods over lecture. (p. 70)

C. Numerous researchers and national reports also discussed the use of active learning strategies in the classroom. Consider the following statements:

> All genuine learning is active, not passive. It is a process of discovery in which the student is the main agent, not the teacher.
>
> (Adler, 1982)

> Students learn what they care about and remember what they understand.
>
> (Ericksen, 1984, p. 51)

> Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing pre-packaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves.
>
> (Chickering and Gamson, 1987, p. 3)

> The sort of teaching we propose requires that we encourage active learning and that we become knowledgeable about the ways in which our students hear, understand, interpret, and integrate ideas.
>
> (AAC Task Group on General Education, 1988, p. 25)

> One must learn by doing the thing, for though you think you know it-- you have no certainty until you try.
>
> (Sophocles, 5th c. B.C.)

III. What obstacles or barriers prevent faculty from using active learning strategies?

Six commonly mentioned obstacles to using active learning strategies include:

A. You cannot cover as much course content in the time available;

B. Devising active learning strategies takes too much pre-class preparation;

C. Large class sizes prevents implementation of active learning strategies;

D. Most instructors think of themselves as being good lecturers;

E. There is a lack of materials or equipment needed to support active learning approaches;

F. Students resist non-lecture approaches.

IV. How can these barriers be overcome?

A. We believe that there are two primary sets of obstacles that prevent faculty from using active learning strategies in the classroom: (1) the six potential obstacles noted above, and (2) the fact that using active learning strategies involves risk

B. With respect to the six commonly reported obstacles, the following should be noted:

1. Admittedly, the use of active learning strategies reduces the amount of available lecture time that can be devoted to content coverage. Faculty who regularly use active learning strategies typically find other ways to ensure that students learn assigned course content (e.g., using reading and writing assignments, through their classroom examinations, etc.)

2 The amount of pre-class preparation time needed to implement active learning strategies will be greater than that needed to "recycle old lectures;" it will not necessarily take any more time than that needed to create thorough and thoughtful new lectures.

3. Large class size may restrict the use of certain active learning strategies (e.g., it is difficult to involve all students in discussion in groups larger than 40) but certainly not all. For example, large classes can be divided into small groups for discussion activities, writing assignments can be read and critiqued by students instead of the instructor, etc.. See Weimer (1987) for several excellent articles on how this can be done.

4. Most instructors see themselves as good lecturers and therefore see no reason to change. Though lecturing is potentially a useful means of

transmitting information, teaching does not equal learning; this can be seen clearly in the painful disparity between what we think we have effectively taught, and what students indicate they have learned on the examination papers that we grade.

5. The lack of materials or equipment needed to support active learning can be a barrier to the use of some active learning strategies but certainly not all. For example, asking students to summarize in writing the material they have read or to form pairs to evaluate statements or assertions does not require any equipment.

6. Students resist non-lecturing approaches because active learning alternatives provide a sharp contrast to the very familiar passive listening role to which they have become accustomed. With explicit instruction in how to actively participate and learn in less-traditional modes, students soon come to favor the new approaches.

C. A second set of potentially more difficult obstacles to overcome involves increasing one's willingness to face two types of risks.

1. There are risks that students will not:

   a. participate actively

   b. learn sufficient course content

   c. use higher order thinking skills

   d. enjoy the experience

2. There are risks that you as a faculty member will not:

   a. feel in control of the class

   b. feel self-confident

   c. possess the needed skills

   d. be viewed by others as teaching in an established fashion

D. Though the classroom use of active learning strategies will always involve some level of risk, by carefully selecting only those active learning strategies that are at a personally comfortable risk level, you can maximize your likelihood of success. Examine Figure 2 below which contrasts dimensions of active learning strategies with regard to their level of risk.

Figure 2

A Comparison of Low and High Risk Active Learning Strategies

Dimension	Low Risk Strategies	High Risk Strategies
Class Time Required	relatively short	relatively long
Degree of Planning	carefully planned	spontaneous
Degree of structure	more structured	less structured
Subject Matter	relatively concrete	relatively abstract
Potential for Controversy	less controversial	more controversial
Students' Prior Knowledge of the Subject Matter	better informed	less informed
Students' Prior Knowledge of the Teaching Technique	familiar	unfamiliar
Instructor's Prior Experience with the Teaching Technique	considerable	limited
Pattern of Interaction	between faculty & students	among students

E. Instructional approaches can be usefully classified in terms of instructor risk they entail. Figure 3 classifies some teaching techniques in terms of these two criteria:

Figure 3

A Classification of Instructional Strategies By Levels of Instructor Risk

Lower Risk Activities

Pause Procedure

Short Writes

- Summarize last lecture, readings, etc.
- What didn't you understand?
- Analytical lists
- Journal entries

Thumbs up/thumbs down response to statement

Surveys or questionnaires

Formative (ungraded) quizzes

Think-Pair-Share

Brainstorming

Pairs/groups develop an outline of the lecture

Structured group discussions (specific questions provided)

Higher Risk Activities

Group Discussion (no structure)

Guided lecture

Individual/group presentations

Pairs/groups develop applications related to lecture content

Pairs/groups write test questions related to lecture material

Students analyze a problem, poem, photography, etc.

Students work a problem then evaluate each others' work

Role plays illustrating a concept from lecture

Responsive lecture

F. Because lecture classes have been the prevailing instructional approach seen most often by faculty when they were undergraduate and graduate students, many faculty have had limited personal experience with, and few role models for, active learning alternatives. To help identify your personal levels of risk and the active learning strategies you might be willing to try in future classes, complete the self-assessment that follows as Figure 4:

Figure 4

A SURVEY OF CLASSROOM TEACHING METHODS

DIRECTIONS: There are many different ways faculty make use of class time. We would like you to describe the teaching strategies you have used *in the class you teach most often*.

Step 1: Carefully read the list of teaching strategies (i.e., the left-hand column) and indicate with a check mark (3) if you used this teaching method the **last time** you taught this class.

Step 2: Then indicate with a check mark (%) whether you would be willing to try this teaching method the **next time** you teach this class.

Teaching Strategy	Last Time	Next Time
I lectured during the entire class period.	( )	( )
I showed a film or video for the entire class period.	( )	( )
During lecture, I gave a short, ungraded quiz to check student comprehension of material	( )	( )
I assigned a short writing activity without having class discussion afterward (e.g., writing end-of-class summaries, providing questions over material)	( )	( )
I had students complete a survey instrument	( )	( )
I had students complete a self-assessment activity (e.g., complete a questionnaire about their beliefs, values, behaviors)	( )	( )
I took the class on a field trip	( )	( )
I assigned a laboratory exercise that was done by students	( )	( )

I lectured with at least 15 minutes of time devoted to recitation or asking questions designed to check student understanding of material (interaction between teacher-student/student-teacher)	( )	( )
I led a class discussion focused on a visual/audio stimulus (e.g., a picture, cartoon, graph, song)	( )	( )
I had students engage in a brainstorming activity (i.e., a group activity designed to generate as many ideas as possible)	( )	( )
I lectured with at least 15 minutes of time devoted to class discussion (interaction between student-student, with occasional questions/remarks by teacher)	( )	( )
I assigned a short writing activity that was followed by at least 15 minutes of class discussion	( )	( )
I assigned an in-class reading activity that was followed by a significant class discussion lasting 15 minutes or more	( )	( )
I assigned a small group discussion or project (e.g., case study work)	( )	( )
I had students complete a problem solving game or simulation in groups	( )	( )
I assigned individual student presentations (e.g., speeches, reports)	( )	( )
I assigned small group presentations (e.g., debates, panel discussions, plays)	( )	( )
I assigned a student-centered class discussion (e.g., students developed the questions and lead the discussion that followed)	( )	( )
I led a role playing activity	( )	( )

G. An *enhanced lecture* is defined as a series of short, mini-lectures punctuated by specific active learning events designed to meet class objectives. Using this model, the enhanced lecture could fall anywhere on the active learning continuum, depending on the complexity and frequency of the strategies used. A simple enhanced lecture could involve two to three pauses during the lecture to allow students to compare notes or ask questions. Those instructors who are familiar and comfortable with more complex strategies might choose to incorporate into the class period lengthy group activities focused on skill development, punctuated with brief mini-lectures that summarize a previous activity or create a transition for the next activity. Again, the extent to which these active learning strategies are incorporated into the lecture depends on the course objectives and the instructor's teaching style. For example, one construct for developing course objectives and associated active learning strategies (for more examples, see Appendix One) would be to ask the questions, as a result of this course:

What should students know (knowledge)?
What should students be able to do (skills)
What should students feel (attitudes)?

H. Risk Activity

From the activities you would be willing to try next time you teach a class, which do you consider to have the greatest personal risk for you? Once you have made that decision, please answer the following questions:

1. What appeals to you about taking the risk?

2. If you took the risk, what could go wrong?

3. If the things you feared most were to happen, what could you do to correct the situation?

I. According to Gorham (1988) the following behaviors promote student learning:
   1. Appropriate use of humor
   2. Praising student performance
   3. Engaging students outside of the classroom
   4. Appropriate level of self-disclosure
   5. Encouraging students to talk
   6. Asking questions about student viewpoints or feelings
   7. Following up on topics raised by students even if not directly related to class material.
   8. Referring to "our" class and what "we" are doing.

J. You can successfully overcome each of the major obstacles or barriers to the use of active learning strategies, and reduce the possibility of failure, by gradually incorporating teaching strategies that increase student activity level and instructor risk into your regular teaching style. *Choose what is appropriate for you within the context of your discipline!*

References

AAC Task Group on General Education. (1988). *A new vitality in general education.* Washington, DC: Association of American Colleges.

Adler, M.J. (1982). *The Paideia proposal: An education manifesto*. NY: Macmillan.

Angelo, T.A. & Cross, P.C. (1993). *Classroom assessment techniques*. Second edition. San Francisco: Jossey-Bass.

Bloom, B., Englehart, E., Furst, W.H., & Krathwohl, D., eds. (1956*). Taxonomy of educational objectives (Cognitive domain).* New York: David McKay Co.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom.* ASHE-ERIC Higher Education Report No. 1. Washington, D.C.: The George Washington University.

Chickering, A.W. & Gamson, Z.F. (1987). Seven principles for good practice. *AAHE Bulletin*, *39*(7), 3-7.

Davis, B.G. (1993). *Tools for teaching*. San Francisco: Jossey-Bass.

Ericksen, S. (1984). *The essence of good teaching*. San Francisco: Jossey-Bass.

Gage, N.L. (1963), Handbook of Research on Teaching. Chicago: Rand McNally.

Gorham, J. (January, 1988). "The relationship between verbal teacher immediacy behaviors and student learning. *Communication Education, 37* (1), 40-53

Hake, R.R. (1998). Interactive engagement v. traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics, 66*, 64-74

Lowman, J. (1995). *Mastering the techniques of teaching.* Second edition. San Francisco: Jossey-Bass.

McKeachie, W.J. (1994). *Teaching tips*. Ninth Edition. Lexington, MA: D.C. Heath

McKeachie, W.J., Pintrich, P.R., Lin, Y.G., & Smith, D.A. (1987). *Teaching and learning in the college classroom: A review of the literature.* Ann Arbor: National Center for Research to Improve Postsecondary Teaching and Learning, The University of Michigan.

Ruhl, K. L., Hughes, C. A., & Schloss, P. J. (1987, Winter). Using the pause procedure to enhance lecture recall. *Teacher Education and Special Education, 10*, 14-18.

Sutherland, T.E. & Bonwell, C.C. eds. (Fall, 1996). *Using active learning in college classes*. New Directions for Teaching and Learning , no. 67. San Francisco: Jossey-Bass.

Thomas, J. (1972). The variation of memory with time for information appearing during a lecture. *Studies in Adult Education, 4,* 57-62.

Weimer, M.G. (Ed.). (1987). *Teaching large classes well.* New Directions for Teaching and Learning, Number 32. San Francisco: Jossey-Bass.

Appendix One

ACTIVE LEARNING STRATEGIES FOR ENHANCING THE LECTURE

Activities to include in the first ten minutes of a lecture.

In an individual writing activity have students summarize the main ideas from the previous class session and speculate (or pose questions) about the upcoming class session.

Ask students to identify one question from the assigned readings that they would like to have answered in class (could be done prior to class). (Open book). Students then share their question with 3 peers and pick one question from the group to pose to the instructor. Finally, each group asks the instructor a question.

Have students gather in groups of 3 or 4 and discuss a) the issues they expect will be relevant to the day's scheduled lecture topic and/or b) what they expect to get from the lecture and how they think it can be used (applied) in their work or outside life.

Give students the plot to the lecture and then begin class by having them write their reflections on a question based on the upcoming lecture. Students can then turn to the person next to them and discuss their responses for five minutes.

Put students into groups of three and have them develop a set of "consensus answers" to a series of eight to ten questions about the topic for the day. After providing correct answers followed by a discussion, reward the group with the most correct answers.

The students could work in small groups to brainstorm and possibly organize past experiences that may relate to the class objective for the day.

Present a concept or a group of concepts to students at the beginning of class. On plain paper, 1) they are instructed to brainstorm ideas related to the concept(s), and 2) draw the relationships among the concept(s) and their ideas. (At the end of class, they will be asked to do this again). This activity may be done in pairs.

During the first 10 minutes provide the students with a problem covered in their previous night's reading. Ask them to hypothesize how the problem might be resolved. Then have them compare their hypothesis with the actual resolution. Have them discuss those factors which were responsible for the differences between the hypothesis and the actual solution.

Activities for the middle 30-45 minutes of class.

Students are randomly assigned to groups (4-6 students) the first class meeting of the quarter. In the first group meeting they get to know each other, name their group, select a spokesperson, select a topic from a list for a group presentation at the end of the quarter, and develop questions that the group wants to ask the instructor ("no holds barred"). This is used in an organized behavior class. Variations, i.e. omitting topic selection, can be used in any class at any time. The group is used in subsequent classes for experiential exercises related to topics.

Use "thumbs up, thumbs down or thumbs sideways". Make a statement about the content and tell students to put their thumbs up if they agree with the statement - thumbs down if they disagree or thumbs sideways if they don't know. Discussion on why the choices were made follows.

Break the students up in small groups (four to five) and assign a role-playing task to highlight different methods/circumstances illustrated by the text or lecture. The students must plan and then act out a short scenario which illustrates the method assigned to their group.

Round table exercise: write a response to a question, then pass it to the person on your left until all in the group have had the opportunity to respond. Responses can also be passed between groups.

Cooperative paraphrase exercise as part of a discussion between pairs ("What I understand you to have said is.....").

Stop and have students engage in a short write ("What do you think and/or feel about what has been said?")

After reading a short essay describing and discussing a concept that is relevant to the task at hand each student reflects on the application of this concept to her life. She then shares with another student her ideas. Feedback (questions of clarification, paraphrasing, etc.) is required before the second student can share his thoughts. Then both students draw conclusions and share those conclusions.

Have students work in small groups to complete a cognitive map (a diagram showing relationships between elements) of concepts addressed in class. Large group discussion follows.

Have students work in small groups to complete an ungraded mini-test over concepts addressed in class. Discussion of the answers follows.

Distribute clearly worded questions, relevant to the topic introduced in the first ten minutes of class, to small groups. Each group discusses their topic, using notes and text, and presents a brief answer to the class. The remaining time is used to summarize and integrate the responses.

Have students find/report statistical information and then prepare generalizations based on those results. For instance, in a geography class, use the current edition of Goodes' World Atlas and have students in groups list the top four Lemo alloy metal producers (countries) from the atlas. Instructor will write these on the board (e.g. Chromicism, countries 1-4, etc.). At this point, the board will be covered with statistics of various metals ("boring" according to students). Then have students work in small groups to make four generalizations about these countries.

When there is a topic which lends itself to the discussion, differences of opinion, etc., and a total class discussion would be "chaotic" or perhaps only a few students might participate, the class is divided into smaller groups (of their choosing or mine). The topic is then addressed in small groups with a "reporter" in each group. After a 10-15 minute time frame, the reporters are asked

to exchange places within the groups, i.e., each reporter ends up in a different group, and continues the exercise sharing input from his/her previous group.

After lecturing for 10-12 minutes with material and information brought by the instructor from sources beyond the class assigned readings, pause for 3-5 minutes. Students, working in ad hoc pairs with someone seated next to them, share what they have understood from the lecture and prepare a two-three statement summary, which a few groups can share subsequently with the entire class (on a voluntary basis).

Require groups of students to determine how to “act out” a concept under discussion: i.e. independent assortment of alleles or electron transport. This would follow the introductory information in the lecture.

During a discussion of a specific technique (i.e., software development), review the basics of the technique. Assign short group tasks to solve a specific problem in phases. Stop the group and discuss the results. Then assign a more complex task until you get the students to solve the entire problem. Use the last few minutes to review the task and assign individual homework using the same technique.

Have a structured group discussion following a film, focusing on controversial issues, ethics, etc.. Provide specific questions to be answered by small groups, each having a facilitator and recorder/reporter.

Have question/answer period where students are assigned to bring one question raised in the course of reading their assignments, on a 3x5 card. Don’t use too often - the questions become pretty dull!

Have the students form small groups (four to five people) and provide each group with a real-life example related to the course content. The students critique the example using what they have learned. For instance, in a research course they could be given a real survey that they can redesign and improve.

Activities to include in the last ten minutes of a lecture.

Hand out 4X6 cards to the students (one per student) and ask them to write down on the cards (one side) the major points covered in the class or the purpose of that specific class. Then, I have them discuss what they have written with a partner for about two minutes. Then, I ask them to write a revised version of the points or purpose on the reverse side of the card, which they hand in as they are leaving class.

Have students working in pairs or groups develop an outline of the day's presentation.

Have students develop an alternative way to present the lecture material

Have students form groups of three or four. Introduce a problem related to today’s content. Ask groups to solve the problem, proposing three alternative strategies towards its resolution.

Divide the class into groups of three to five, depending on size of class. Ask each group to propose three goals which they would like the class to accomplish at the next meeting.

Have students form groups and write one or two good multiple choice questions and present these questions (via overhead) to the class. Discuss the questions.

Have students review each other's notes to enhance learning.

Have students answer the discussion questions at the end of the assigned chapter. They then explain their answers to the class.

Have students summarize the main topics of discussion in one or two paragraphs and then relate them to yesterday's discussion.

Have students evaluate each other’s work-- in this time frame, something very small (notecards for research papers, for example), making sure they have grading instructions. To ensure low risk: create short, structured specific roles. Make sure student's know each other’s names.

Have students keep a journal, taking a few minutes to write down their feelings and thoughts regarding various topics.

Select Active Learning Articles (1995-1999)

Charles C. Bonwell, May, 2000

This is a bibliography in the making. Its purpose is not to provide an exhaustive bibliography: rather it hopes to present examples of good practice. If you are aware of other articles that would be useful for teachers engaging in active learning, email me at bonwell@ix.netcom.com and I will include them in the next revision.

Business

Berg, J.D., Hughes, J., McCabe, J., & Rayburn, K. (1995). Capital market experience for financial accounting students. *Contemporary Accounting Research, 11*(2), 941-958.

Bradford, B.M., & Peck, M.W. (1997). Achieving AECC outcomes through the seven principles for good practice in undergraduate education. Journal of Education for Business, 72, 364-368.

Krunweide, T. & Bline, D. (1997). Encouraging active learning through the use of student developed problems. *The Accounting Educators' Journal, 9*(2), 116-129.

Seipel, C. & Tunnell, L. (1995). Using a comment sheet to grade accounting written assignments. *Accounting Educators' Journal, 7*(2), 159-165.

Smith, D.C., Nelson, S.J., & Moncada, S.M. What writing skills should accounting students be taught? (1998). *Business Education Forum, 52*(4), 43-44.

Humanities

Bahner, S. (1995). Short takes on writing: The 60-minute collaborative paper. *College Teaching, 43*(1), 14-15.

Jones, P., Taylor, A. & Tate, D. (1997). Flip it! And you be the judge: Two cooperative-learning activities to teach foreign languages. *Cooperative Learning and College Teaching, 7*(2), 5-7.

Mark, B. L. & T.E. Jacobson. (1995). Teaching anxious students skills for the electronic library. *College Teaching, 43*(1),28-29.

Pebworth, M. & Cooper, G. (1997). The poster/POST-IT activity: In the discussion section and beyond. *College Teaching, 45*(1), 7-9.

Sciences/Applied Sciences

Becker, E.S. (1997). Teaching ethics as a writing-intensive, ability-based course. *Journal of Pharmacy Teaching, 6*(½), 139-144

Dean, E.E. (1996). Teaching the proof process: A model for discovery learning. *College Teaching, 44*(2), 52-55.

Deering, C.G., & Shaw, S.J. (1997). Dealing with difficult students in the classroom. *Nurse Educator, 22*(5), 19-23.

Garrett, M., Schoener, L., & Hood, L. (1996). Debate: A teaching strategy to improve verbal communication and critical-thinking skills. *Nurse Educator, 21*(4), 37-40.

Gosser, D.G. & Roth, V. (1998). The workshop chemistry project: Peer-led team learning. *Journal of Chemical Education, 75*(2), 185-187.

Haddad, A.M. (1997). Teaching ethics as a writing-intensive, ability-based course. *Journal of Pharmacy Teaching, 6*(½), 49-64.

Hare, A.C. (1997). Active Learning and assessment in mathematics. *College Teaching, 45*(2), 76-77.

Herreid, C.F. (1998). Sorting potatoes for Miss Bonner: Bringing order to case-study methodology through a classification scheme. *Journal of College Science Teaching, 27*(4), 236-239.

Hodges, L.C. (March, 1999). Active learning in upper-level chemistry courses: A biochemistry example. *Journal of Chemical Education, 76*(3), 376-77.

Hofer, B.K. (1999). Instructional context in the college mathematics classroom: epistemological beliefs and student motivation. *Journal of Staff, Program & Organizational Development, 16*(2), 73-82.

Kovac, J. (January, 1999). Student active learning methods in general chemistry. *Journal of Chemical Education, 76*(1), 120-124.

Lunsford, B.E., & Herzog, M.J.R. (1997). Active learning in anatomy and physiology: Student reactions & outcomes in a nontraditional A&P course. *The American Biology Teacher, 59*(2), 80-84.

Mahavier, W.T. (1997). A gentle discovery method (the modified Texas approach). College Teaching, 45(4), 132-135.

Paulson, D.R. (August, 1999). Active learning and cooperative learning in the organic chemistry lecture class. *Journal of Chemical Education, 76*(8), 1136-40.

Richards, L.G. & others. (1995). Promoting active learning with cases and instructional modules. *Journal of Engineering Education, 84*(4), 375-381.

Rice, R.E. (1998). "Scientific writing"—a course to improve the writing of science students. *Journal of College Science Teaching, 27*(4), 267-272.

Rosenthal, J.S. (1995). Active learning strategies in advanced mathematics classes. *Studies in Higher Education, 20*(2), 223-228.

Savarese, M. (1998). Collaborative learning in an upper-division university geobiology course. *Journal of Geoscience Education, 46*(1), 61-66.

Summers, P. (1997). Math specimens. *The National Teaching and Learning Forum, 6*(4), 10-11.

Sutcliffe, R.G., Cogdell, B., Hansell, M.H., & McAteer, E. (February, 1999). Active learning in a large first year biology class: A collaborative resource-based study project on "AIDS in Science and Society". *Innovations in Education and Training International, 36*(1), 53-64.

Towns, M.H. (1998). How do I get my students to work together? Getting cooperative learning started. *Journal of Chemical Education, 75*(1), 67-69.

Weinstein, B.D., (19?). Teaching ethics as a writing-intensive, ability-based course. *Journal of Pharmacy Teaching, 6*(½), 1932.

Zoller, U. (May, 1999). Scaling-up of higher-order cognitive skills-oriented college chemistry teaching: An action-oriented research. *Journal of Research in Science Teaching, 36*(5), 583-96.

Social Sciences

Blinde, E.M. (1995). Teaching sociology of sport: An active learning approach. *Teaching Sociology, 23*(3), 264-268.

Britt, M.A. (1995). Research on trial: A pedagogy for research methods instruction. Teaching of Psychology: Ideas and Innovations. Proceedings of the Annual Conference on Undergraduate Teaching of Psychology (9th, Ellenville, NY, March 22-24) ED 389374 JC960019.

Carkenord, D.M. (1996). A group exercise to explore employee ethics in business-related psychology courses. *Teaching of Psychology, 23*(2), 100-102.

Conn, C.L. (1995). Graphing-to-learn in economics. *College Teaching 43*(3), 110-111.

Henderson, B.B. (1995). Critical-thinking exercises for the history of psychology course. *Teaching of Psychology, 22*(1), 60-63.

Giordano, P.J. & Hammer, E.Y. (1999). In-class collaborative learning: Practical suggestions from the teaching trenches. *Teaching of Psychology, 26*(1), 42-44.

Hoban, G. (Fall,1999). Using a reflective framework for experiential education in teacher education classes. *Journal of Experiential Education, 22*(2), 104-111.

Jacobsen, R.E. & Mark, B.E. (1995). Teaching in the information age: Active learning techniques to empower students. *Reference Librarian*, (51-52), 105-120.

Lawson, T.J. (1995). Active-learning exercises for consumer behavior courses. *Teaching of Psychology, 22*(3), 200-202.

Meyers, S.A. (1997). Increasing student participation and productivity in small-group activities for psychology classes. *Teaching of Psychology, 24*(2), 105-115.

Pernecky, M. (1997). Debate for the economics class—and others. *College Teaching, 45*(4), 136-138.

Ragains, P. (1995). Four variations on Drueke's active learning paradigm. *Research Strategies, 13*(1), 40-50. [Library Science]

Shackelford, J, Thompson, D., & James, M.B. (Summer, 1999). Teaching strategy and assignment design: Assessing the quality and validity of information via the web. *Social Science Computer Review, 17*(2), 196-208.

General

Bonwell, C. (1996). Building a supportive climate for active learning. *The National Teaching and Learning Forum, 6*(1), 4-7.

Cashin, W.E. (January,1995). Answering and asking questions. IDEA Paper No. 31, Center for Faculty Evaluation and Development, Kansas State University.

Cuseo, J.B. (1997). Guidelines for group work. *Cooperative Learning and College Teaching, 7*(3), 11-16.

Cuseo, J.B. (1997). Tips for students when forming learning teams: How to collaborate with peers to improve your academic performance. *Cooperative Learning and College Teaching, 8*(1), 7-9.

Downey, J.K. (1997). Resisting and yielding to small groups. *The National Teaching and Learning Forum, 6*(2), 6-7.

Frederick, P. (1995). Walking on eggs: Mastering the dreaded diversity discussion. *College Teaching, 43*(3), 83-92.

Gallos, J.V. (995). Gender and silence: Implication of women's way of knowing. *College Teaching, 43*(3), 101-105.

Goodman, D.J. (1995). Difficult dialogues: Enhancing discussions about diversity. *College Teaching, 43*(2), 47-52.

Johnston, S. & Cooper, J. (1997). Quick-thinks: Active-thinking tasks in lecture classes and televised instruction. *Cooperative Learning and College Teaching, 8*(1), 2-6.

Kagan, S. & Kagan, M. (1997). Timed-pair-share and showdown: Simple co-op structures for divergent and convergent thinking. *Cooperative Learning and College Teaching, 7*(2), 2-5.

Kelley, S.M., Shemberg, K.M., Cowell, B.S. & Zinnbaur, B.J. (1995). Coping with students resistence to critical thinking: What the psychotherapy literature can tell us. *College Teaching, 43*(4), 140-145.

Millis, B.J. (1997). Bringing closure: Some report-out methods. *Cooperative Learning and College Teaching, 7*(3), 2-3.

Romance, N.R., & Vitale, M.R. (Spring, 1999).Concept mapping as a tool for learning: Broadening the framework for student-centered instruction. *College Teaching, 47*(2), 74-79.

Rubin, l. & Hebert, C. (1998). Model for active learning: Collaborative peer teaching. College Teaching, 46(1), 26-30.

Russell, J.D., Reiser, R.A., Hruskocy, C., & Ruckdeschel, C. (March-April, 1999). Strategies for teaching project-based courses. *Educational Technology, 39*(2), 56-59.

Possible Applications:

As you reflect upon the session to this point, how might you apply what you have heard to your courses or classroom?

The “Change-up” in Lectures

Joan Middendorf & Alan Kalish. TRC Newsletter, 8:1 (Fall 1996).

Instructors and students often have the same mental image of how a college class works: The professor talks (lectures); the students usually listen and occasionally write something in their notes. But as teaching consultants visiting a great many classes, we've found the real picture looks somewhat different.

Listen to a colleague reporting on a recent visit: I sat in the back of the classroom, observing and taking careful notes as usual. The class had started at 1:00 o'clock. The student sitting in front of me took copious notes until 1:20. Then he just nodded off. The student sat motionless, with eyes shut for about a minute and a half, pen still poised. Then he awoke, and continued his rapid note-taking as if he hadn't missed a beat.

Not infrequently we observe students having lapses of attention. And we've found that it's not enough for us to tell faculty with whom we are working about the problem. They're often aware of it already. What really makes a difference is for us to be able to offer a little theory, which we will do in the first part of this article, and then some concrete suggestions of activities they can use in their classes to break up a particular lecture on a particular day.

One explanation for the lapses in students' attention is that the "information transfer" model of the traditional lecture does not match what current cognitive science research tells us of how humans learn. Research tells us that the brain does not record information like a videocassette recorder. Instead, it handles information by reducing it into meaningful chunks, that we call categories. Learning consists of fitting this reduced information into already existing categories or, sometimes, of forming new ones. Categorization determines how a concept is acquired, how it is retrieved from memory, and how it is put to work in abstracting or generating inferences. Examples are a primary means of making connections between old knowledge and new knowledge. Their concreteness allows students to draw connections between the new, abstract idea or principle and what they already know. Once a new concept has been introduced, students need an opportunity to practice thinking in terms of that concept. Right in a lecture class, you can ask students to generate their own example of the concept, summarize it, write an exam question for it, or explain it to someone else. This approach works with the mind's natural processes, and thus improves learning (Savion & Middendorf, 1994).

Studies on attention span also shed light on why students have difficulty with the traditional lecture format. Adult learners can keep tuned in to a lecture for no more than 15 to 20 minutes at a time, and this at the beginning of the class. In 1976, A. H. Johnstone and F. Percival observed students in over 90 lectures, with twelve different lecturers, recording breaks in student attention. They identified a general pattern: After three to five minutes of "settling down" at the start of class, one study found that "the next lapse of attention usually occurred some 10 to 18 minutes later, and as the lecture proceeded the

attention span became shorter and often fell to three or four minutes towards the end of a standard lecture" (pp. 49-50). Other studies appear to confirm these findings.

In 1985 Ralph A. Burns (1985) asked students to write summaries of presentations and tallied the bits of information reported by the "half-minute segment of the presentation" in which they occurred. He reports that students recalled the most information from the first five minutes of the presentation. "Impact declined, but was relatively constant for the next two 5-minute portions, and dropped to the lowest level during the 15- to 20-minute interval" (Burns, 1985). Both of these studies note the severe lapse of attention 15 to 20 minutes into a lecture. As researcher P. J. Fensham observes, "During the falls [in attention] the student has, in effect, phased out of attending to the information flow" (1992, p. 510)

Given that students have an attention span of around 15 to 20 minutes and that university classes are scheduled for around 50 or 75 minutes, instructors must do something to control their students' attention. We recommend building a "change-up" into your class to restart the attention clock. If your main mode of instruction is lecture, clearly the primary activity for most of your students is listening to one person talk; even in whole class discussion, only the student actually speaking at any given time is doing anything other than listening. Combining what we know about attention span and how the mind works, we suggest that lectures should be punctuated with periodic activities.

Johnstone and Percival (1976) report that lecturers who "adopted a varied approach . . . and deliberately and consistently interspersed their lectures with illustrative models or experiments, . . . short problem solving sessions, or some other form of deliberate break . . . usually commanded a better attention span from the class, and these deliberate variations had the effect of postponing or even eliminating the occurrence of an attention break" (p. 50). Many of our colleagues also report that when they intersperse mini-lectures with active engagement for students for as brief a time as two to five minutes, students seem re-energized for the next 15 to 20 minute mini-lecture.

By planning exactly when to insert an activity, you can make sure that your students pay the most attention to the issues which you feel are most important.

Don't do activities for their own sake; they should be integrally related to giving students practice with the most important concepts in that day's class. So, telling jokes about lawyers halfway through a fifty minute economics class will change students' level of attention, but will add little to their learning of cost/benefit analysis.

Varying your approach to teaching also allows you to get your students actively involved in their own learning. The research on the mind gives us the theoretic base for advocating active learning. A large body of literature tells us that when the goal is to foster higher level cognitive or affective learning, teaching methods which encourage student activity and involvement are preferable to more passive methods (Sorcinelli, 1991).

Active learning lets you give your students opportunities in class to practice with the concepts you want

them to learn. Particularly effective for getting students actively engaged in the classroom are collaborative learning techniques. What better way to get students active than to have them explain their new knowledge to one another? By making the classroom a social learning experience instead of a solitary one, instructors can reduce the student passivity through which some students seem to hide out in large classes. Research confirms that breaking down the walls of anonymity promotes learning (Sorcinelli, 1991).

One colleague, who teaches journalism, told us that he fell into using small groups by accident, but they generated so much energy and interest in class that he now uses them regularly: "I wanted to show some slides and have the entire class talk about [them], but the slides didn't get processed in time. So I got half a dozen magazine spreads, and I divided the [students] up into six groups. I was really, really shocked, but delighted, to see what a tremendous wave of energy this released in the class. All of a sudden these students who had been sitting there listening very passively got very energetic; they began to talk to each other, and they were actually doing exactly what I wanted them to do." (Cookman interview, 1994)

When you plan your classes, you will want to decide how often to add a change-up and what activity to use. Use the 20 minute attention span as a rule of thumb: in a 50 minute class, use one change up in the middle; in a 75 minute class, use two change-ups, at roughly 1/3 and 2/3 of the way through the class period. But don't follow this slavishly; anything that becomes predictable will have less impact. Variety is a powerful force. Having a handful of activities you can use comfortably will keep the students guessing, wondering what you will do next. Be sure to earmark at least one third of the time you allow for the activity for debriefing afterwards; this is when most of the substantive lessons of the activity will be confirmed. Without a wrap-up, students see these activities as amorphous and sometimes confusing; a concluding debriefing helps them understand what was important and what was not.

A Change-Up Sampler

The list below presents many options for changing the activity for all of your students at once, allowing you to revitalize their attention when you want to do so and to get them actively involved with the material. You should be able to find a few here that work for you. On that dark night of the teaching soul, when you have run out of ideas for a change-up, pick something new from this list.

Student Generated Questions:

a. *Write a Question*
   The simplest of these techniques: instead of saying, "Are there any questions?", ask each student to write down one to three questions they have about the material just covered in class. Then ask several (volunteers at first) what their questions are and answer them (or get other students to answer them). Writing their questions down gives them all a chance to work out what they really do not know and seeing the questions in writing helps them feel authorized to ask them.

b. *Guided Reciprocal Peer Questioning*

Show students a set of generic question stems (see samples below). Each student writes down questions about the material just covered in class. They need not be able to answer their own questions; the purpose is to generate discussion. Groups of four students then discuss possible answers to the questions each group member wrote. Sample Generic Question Stems "What is the main idea of ___?" "What is a new example of ___?" What is the difference between ___ and ___?" "What are the strengths and weaknesses of ___?" (Millis & Cottell, 1993)

c. *Press Conference*
Alone or in pairs, students generate press-conference style questions to ask you or a panel of students who had been assigned to prepare on the topic. (Thiagarajan, 1988)

d. *Exam Questions*
Alone, or in pairs, or groups of three, students write an exam question about material just covered in class. (They should follow the format of your actual exam - essay, multiple-choice, etc.) After a brief time for discussion, you select at least four groups to report their questions to the whole class. Write these on the board and ask other students to critique them (give specific criteria). You can collect all of the questions in writing; use the best ones on the exam! (Angelo & Cross, 1993)

e. *Send a Problem*
Each team member writes a review question on a card and her teammates try to answer it, writing their consensus on the back. The cards are then passed to the other teams for their answers. (Wright, 1994)

f. *Student-Developed Cases*
Alone or in small groups, ask students to develop a case (a fictional situation which presents a problem) based on the theory of the current topic. This can be done in class, as homework, or both. The class should then discuss several of the cases.

g. *Minute Papers*
At the end of a class or a section of material, ask your students to write for a minute or three. Questions such as "What was the most important point of today's class?" or "What question do you still have about this material?" give you important feedback about the students' comprehension and a useful starting point for the next class. (Schwartz as described in Wilson, 1986; see also Angelo & Cross, 1993)

Problem Solving:

a. *Think (or Write) - Pair - Share*
Pose a question which requires analysis, evaluation, or synthesis. Each student thinks or writes on this question for one minute, then turns to the person next to him to compare ideas. Then the pairs share their ideas with some larger group (pairs of pairs, section of the class, or whole group). (Wright, 1994)

b. *Paired Discussions*
In three or four minutes, have students discuss something with the person next to them: summarize class so far; react to theory, concepts, or information being presented; relate today's material to past learning; etc. Make your question as specific as you can. (Wright, 1994)

c. *Practice Exam Question or Homework Problem*
Give the students a sample exam question or homework problem for practice. Either works quite well with more quantitative problems. Ask several students at random to report their answers to the class. Giving the students a chance to practice the type of questions they might see on homework assignments or examinations will give them more confidence when they have to work them alone. (Derek Bok Center, 1992)

d. *Finding Illustrative Quotations*
Alone or in small groups, ask students to reread the text for the day to find quotations to support a specific position. You can have all groups look for support for the same position or several different ones. (Frederick, 1981)

e. *Concrete Images*
To help students to make specific references to the text, go around the room and ask each one to state a concrete image/scene/event/moment that stands out to them. List them on the board. Follow up by having them find themes or patterns, missing points, etc. Then discussion can move to analysis with a common collection of facts. (Frederick, 1981)

Generating Ideas:

a. *Brainstorming*
Help students to see what they know by recording all of their ideas, recollections, etc. on the board. Ask students to call out any ideas they have. Write the ideas down first without analyzing them, then move to critical discussion. Buzz Groups Give one or two prepared questions to groups of three to five students. Each group records its discussion and reports to the whole class. Then help the class synthesize the groups' answers. (Berquist & Phillips, 1975)

b. *Roundtable*
A brainstorming technique in which students take turns writing on a single pad of paper, saying their ideas aloud as they write. Each tries to add to what has already been said. (Wright, 1994)

c. *Truth Statements*
Ask several small groups to decide on three things they know to be true about some particular issue. This is useful when introducing a new topic which students think they know a great deal, but their assumptions about it need to be examined. (Frederick, 1981)

d. *Picture Making*
Choose (perhaps with help from class) several principles or questions which could be illustrated. Groups of four or five students each illustrate one on the board or on large chart paper. Each

group explains its picture to the class, followed by discussion. (Berquist & Phillips, 1975)

e. *Kisses and Crackers*
To overcome the flagging of attention, when you notice energy and attention diminishing, pass out crackers and Hershey's kisses. The professor who taught us this technique tells us that research in "accelerated learning" shows that eating about once per hour actually promotes learning. Not only does the food wake students up, the mere act of passing the bags around changes the activity and refocuses attention. He says that this also helps students feel good about his class and him and to overcome science anxiety. (A. Basu, personal communication, February 1991)

Controversial Topics:

a. *Structured Controversy*
Class members (or groups) to take different positions on an issue (you can assign positions), discussing, researching, and sharing their findings with the class. (Wright, 1994)

b. *Reaction Sheet*
After presenting a controversial topic, pass around several sheets to collect written reactions to these three questions: "What ideas do you question," "What ideas are new to you," and "What ideas really hit home?" Follow up with discussion. Variations are to ask each student to write their own sheet or to have small groups do so. (Berquist & Phillips, 1975)

c. *Value Lines*
Students line up according to how strongly they agree or disagree with a proposition or how strongly they value something. This gives a visual reading of the continuum of feelings in the group. Next, sort students into heterogeneous groups for discussion by grouping one from either end with two from the middle. Ask students to listen to differing viewpoints in their groups and to fairly paraphrase opposing positions. (Wright, 1994)

d. *Forced Debate*
Ask all students who agree with a proposition to sit on one side of the room and all opposed on the other side. Hanging signs describing the propositions helps. It is important that they physically take a position and that the opposing sides face each other. After they have sorted themselves out, switch the signs and force them to argue for the position with which they disagree. This is one of very few activities which gets people to consider viewpoints in opposition to their own strongly held opinions. (see also Frederick, 1981)

e. *Role Playing*
Ask several students to take on the roles of participants in the situations being studied, characters from a novel, historical figures, representatives of political or theoretical positions, science foundation grant evaluators, etc. To reduce the students' fear, you might allow them some choice as to how involved they get, asking for volunteers for major roles and allowing some roles to be played by groups of students. You might also give them some time to prepare: a few days outside

of class to research their roles, 15 minutes to confer in small groups, or five minutes to refresh their memories. Also, the definition of the roles and their goals must be clear and concrete. (Frederick, 1981)

f. *Student Self-Evaluation*
Have the students write a brief evaluation of their learning. After an essay (or project) have them answer the following: Now that you have finished your essay [or project], please answer the following questions. There are no right or wrong answers; I am interested in your analysis of your experience writing this essay [or doing this project].
    1. What problems did you face during the writing of this essay?
    2. What solutions did you find for those problems?
    3. What do you think are the strengths of this essay [project]?
    4. What alternative plans for this essay [project] did you consider? Why did you reject them?
    5. Imagine you had more time to write this essay [work on this project]. What would you do if you were to continue working on it?

(Allen & Roswell, 1989, as cited in MacGregor, 1993) See MacGregor for several other ideas on student self-evaluation.

Vary Media:

- Slides, overheads, pictures
- Video clips
- Music or sound

Use a brief selection of a medium to provide a shared example or experience as a basis for discussion or analysis. Follow these guidelines for active viewing or listening:

a. *Pre-viewing or listening*:
    - Introduce the video/film/sound by providing an overview of its content, a rationale of how it relates to the current topic being studied, and a reason students need to know about it.
    - Direct student attention to specific aspects of the presentation by asking them questions to answer following the presentation.

b. *Viewing or listening*:
    - You do not need to show all of a video or film, nor to play an entire song; just the relevant parts, for best use of class time and greatest impact.
    - It may also be useful to stop the presentation at appropriate points for discussion or clarification.

c. *Post-viewing or listening*:
    - Follow-up a video or film with an activity that allows students to respond to or extend ideas presented.
    - Discussions, short writing assignments, or application exercises, for example, will

reinforce the concepts and increase learning from classroom audio-visuals. (Middendorf, 1993)

References

Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques*. San Francisco: Jossey-Bass.

Berquist, W. H. & Phillips, S. R. (Eds.). (1975). Classroom structures which encourage student participation. In Gary H. Quel (General Editor). *A handbook for faculty development* (pp. 118-121). The Council for the Advancement of Small Colleges in association with The College Center of the Finger Lakes.

Burns, R. A. (1985, May). Information impact and factors affecting recall. Paper presented at Annual National Conference on Teaching Excellence and Conference of Administrators, Austin TX. (ERIC Document Reproduction Service No. ED 258 639)

Cookman, C. (1994). [Interview with Joan Middendorf].

Derek Bok Center for Teaching and Learning, Harvard University (Producer). (1992). T*hinking together: Collaborative learning in science* [Videotape]. (Available from Anker Publishing Company, Inc., P. O. Box 249, Bolton, MA 01740-0249).

Fensham, P. J. (1992). Science education at first degree level. *International Journal of Science Education, 14* (5), 505-514.

Frederick, P. (1981). The dreaded discussion: Ten ways to start. *Improving College and University Teaching, 29* (3), 109-114.

Frederick, P. (1986). The lively lecture: Eight variations. *College Teaching, 34* (2), 43-50.

Johnstone, A. H., & Percival, F. (1976). Attention breaks in lectures. *Education in Chemistry, 13,* 49-50

MacGregor, J. (Eds.). (1993). Appendix to *New Directions in Teaching and Learning, 56,* 101-117.

Millis B. J., & Cottell, P. G. (1993, October). *Moving beyond the basics: Cooperative learning strategies for advanced practitioners*. Paper presented at 1993 POD National Conference, Rochester, MN.

Middendorf, J. (1993). Active viewing for video, films, and other audio visuals. *Teaching Resources Center Newsletter, 4* (1), 3.

Savion, L., & Middendorf, J. (1994). Enhancing concept comprehension and retention. *National Teaching and Learning Forum*, *3*(4), 6-8.

Sorcinelli, M. D. (1991). Research findings on the seven principles. *New Directions for Teaching and Learning*, *47*, 13-25.

Thiagarajan, S. (1988). Reading assignments: 13 interactive strategies for making sure your students read them. *Performance and Instruction*, *27*(9), 45-49.

Wilson, R. C. (1986). Improving faculty teaching. *Journal of Higher Education*, *57* (2), 195.

Wright, D. L. (1994). Using learning groups in your classroom: A few how-to's. *Teaching at UNL (University of Nebraska - Lincoln)*, *15* (4) 1-2, 4-5.

ARTICLE

An Initial Experience with "Team Learning" in Medical Education

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ABSTRACT

Team learning is an approach to large-group teaching that combines the strengths of small-group interactive learning with teacher-driven content delivery. Team learning has been used successfully in professional disciplines other than medicine. The authors describe a field test of team learning in the setting of an internal medicine residency noontime lecture in the spring of 2000 at Baylor College of Medicine. They surveyed residents on their attitudes toward the usefulness of the lecture content before and after the session and surveyed them on their engagement in learning. Residents reported their engagement as high and demonstrated favorable changes in their attitudes about the usefulness of the lecture content to their daily medical practice. The authors describe their adaptation of the team-learning approach and conclude that team learning may be a useful new pedagogic tool in medical education.

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In the past decade, medical education has witnessed a growing momentum of curricular reforms aimed at improving pedagogy and learning outcomes. Many of these reforms have included the introduction of teaching methods aimed at promoting active learning among students. However, while these much-needed reforms are being implemented, medical education finds itself reeling from the impact of recent changes in health care financing to contain costs. The progress that has been made in introducing resource-intensive pedagogic methods that foster active learning is threatened by such cost-containment practices, because those practices result in less time and fewer faculty members for teaching.

Teachers at Baylor College of Medicine were recently introduced to "team learning," a teaching approach that has been used to successfully promote active learning in professional disciplines other than medicine.[1] Team learning brings together theoretically based and empirically grounded strategies for incorporating the effectiveness of small-group learning into large-group, lecture-oriented sessions. In this report, we describe our initial experience in adapting elements of team learning to overcome common learning barriers during a noontime lecture session with internal medicine residents. We describe the effects of team learning on learners' engagement and attitudes toward the usefulness of the session content.

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The opinions and findings reported in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs or Baylor College of Medicine.

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BACKGROUND

Team Learning at Baylor

In the fall of 1999, Larry K. Michaelsen, PhD, David Ross Boyd Professor of Management at the University of Oklahoma and a Fellow of the Carnegie Foundation, conducted a one-day series of large-group sessions and workshops with educators at the Baylor College of Medicine. Dr. Michaelsen has been a leader in the development and dissemination of the team-learning method.[1–3] In his sessions at Baylor, Dr. Michaelsen employed a modified team-learning approach to demonstrate its powerful effects in promoting active participation among learners while covering desired

content. His sessions had a great impact on the faculty participants, and several of these faculty proceeded to employ aspects of the team-learning approach in their own teaching. This impact expanded throughout the curriculum as deans and educators at Baylor became interested in employing team learning more widely, based on the positive initial experiences of the faculty who had field-tested it in their teaching. This report details one such field test in an effort to demonstrate the application and illustrate the potential positive effects of team learning in health sciences education.

Characteristics of Team Learning

In-depth descriptions of the team-learning method are available[2,3]; here, we describe the features of team learning that were salient to our field test. Team learning relies on the division of the class into heterogeneous groups of three to five students each. The teacher assigns groups to solve identical tasks and to simultaneously report their solutions. After each task, the teacher facilitates a discussion where groups defend their different solutions and the teacher articulates key teaching points.[2] A critical component of team learning is the construction of the tasks themselves. Effective tasks stimulate higher-level cognitive skills (i.e., the student makes a value judgment based on a concept rather than just identifying the concept), require broad participation within groups to reach group consensus, and lead to competing plausible answers among groups.[3] Such tasks foster a lively teacher-facilitated discussion by the entire class that requires groups to defend their answers. This constructive controversy results in greater subject learning, better conceptual structures, and more accurate retention.[4]

DESCRIPTION OF OUR PROGRAM

Session Content and Setting

In the fall of 2000, we (the present authors) chose to teach a session on effective use of diagnostic tests (part of the evidence-based medicine noontime lecture series for internal medicine residents) in our field test of team learning. We chose this session setting and content for two reasons. First, the noontime lecture series is a teaching forum familiar to most internal medicine residents, and, as the name implies, usually employs the lecture method, a predominately passive mode of learning. There are several common distractions during noontime lectures that include pressing patient-care concerns, eating lunch, and socializing. Since team learning is aligned toward producing active participation among learners, we wanted to observe its effects in a forum that typically achieves little participation.

The second reason we chose this session was for the content on effective ordering of diagnostic tests. Previous work has demonstrated that during the routine care of patients, physicians employ evidence-based practice principles infrequently.[5,6] Our experience with residents supports these findings, in that we have observed residents to apply such principles infrequently in their work on the medical wards. We therefore wanted to observe the ability of team learning to promote favorable attitudes toward the utility of evidence-based practice with respect to selection of diagnostic tests, a topic that has direct application to residents' daily decisions in patient care.

Session Goals and Format

Our goals for the session on diagnostic tests included fostering learners' abilities to (1) define the concepts of sensitivity and specificity; (2) define the concepts of positive and negative predictive value; (3) describe the concept of prevalence and if/how it affects the above items; and (4) identify the usefulness of information that given tests provide in a particular situation. We designed the session to be one hour in length divided into three repeating cycles of group task-solving followed by simultaneous reporting of group answers and facilitated discussion among the entire class. A timeline for the session appears in Table 1. A pure team-learning

Table 1

Timeline for Residents' Session on Diagnostic Tests Using the Team-learning Approach, Baylor College of Medicine, 2000

Time	Activity	Activity Content
First three min.	Divide class into groups	NA
Next seven min.	Small-group work on Task 1	Sensitivity and specificity
Next ten min.	Whole-class discussion of Task 1	Sensitivity and specificity
Next ten min.	Small-group work on Task 2	Positive and negative predictive value
Next ten min.	Whole-class discussion of Task 2	Positive and negative predictive value
Next ten min.	Small-group work on Task 3	Application of concepts learned
Last ten min.	Whole-class discussion of Task 3, wrap-up	Application of concepts learned

approach would require advance reading/self-directed study by the learners with a readiness-assurance process at the beginning of the session. However, in an effort to eliminate the need for advance preparation by busy and often overworked residents, we designed a one-page handout that was given to each learner at the beginning of the session. The handout contained the background information necessary to successfully complete the tasks (see Appendix A).

Learning Tasks

We designed our three group tasks to introduce and stimulate thinking about each of the four session goals. As an example, our first two tasks are described in Appendix B. In the first task (definition of sensitivity/specificity), items 2 and 3 required learners to understand the conceptual definitions of sensitivity and specificity and codify these in language and mathematical terms. Items 1 and 4 required learners to make value judgments based on their understanding of the definitions and defend those judgments to their group and subsequently to the class. In the second task, items 2 and 3 required the learners to understand definitions and apply these definitions to relationships between sensitivity/specificity, positive/negative predictive value, and prevalence. Items 1 and 4 had ambiguity built in to the sentence structure ("same thing" and "tell you whether or not the disease is there") and required learners to clarify their understanding of the concepts in order to interpret the items. The complexity of items 2 and 3 and the introduction of learners' values and interpretations into items 1 and 4 in both tasks ensured the necessary ambiguity for fostering controversy during the class discussion. Using this controversy during the large-group discussion, the teacher (PH) was able to focus learners on the conceptual definitions of terms and make points about the utility of the concepts.

PROGRAM EVALUATION

We conducted the same session at two teaching hospitals on successive dates with the same presenter (PH) and the lesson plan described above. We made qualitative observations based on our own past experience with the noontime lecture forum. In addition, we asked the residents to complete a survey immediately before and after each session about their attitudes toward the usefulness of sensitivity/specificity and positive/negative predictive value, using a two-item scale for each of these concepts. The post-survey asked each resident to complete an additional two-item scale to rate his or her level of engagement during the session. Individual items on all three scales had five response options in Likert style. For each scale, the total score was the sum of the responses for each item. All three scales demonstrated adequate internal consistency (Cronbach's alpha = 0.60 to 0.87).

Our qualitative observations were striking. In a typical noontime lecture at our institution, lunch is served at 12 o'clock, with residents filing into the lecture room gradually until approximately 12:15. This means that the actual session time is usually 45 minutes, instead of one hour. In the past, we have observed up to half of residents leaving the session when the lecturer ran longer than 1 PM. We hypothesized that the team-learning method would keep residents engaged, and therefore designed the session to test this hypothesis by starting at 12:15 and ending at 1:15. We wanted to observe whether residents would leave at 1 PM or, without prompting, continue to stay at the session. On both days, more than 95% of the residents stayed until the completion of the session. In addition, the teacher specifically observed the class during the session in an effort to identify learners who appeared to be disengaged or not "on-task." No disengaged learner could be identified during either session. We also invited an independent observer trained in peer review

Table 2

Residents' Mean Scores from Surveys Given before and after Two Consecutive Team-learning Sessions, Baylor College of Medicine, 2000*

		Sensitivity/Specificity Attitudes		Pos/Neg Predictive Value Attitudes	
Session	No. Students	Pre-survey Mean (SD)	Post-survey Mean (SD)	Pre-survey Mean (SD)	Post-survey Mean (SD)
First	16	7.8 (1.7)	7.6 (1.5)	6.3 (1.7)	7.6 (1.7)†
Second	11	7.2 (1.4)	8.2 (.90)†	5.8 (2.3)	7.7 (1.2)†
TOTAL	27	7.4 (1.5)	7.9 (1.3)†	6.0 (2.1)	7.7 (1.5)†

*Residents rated their attitudes about the utility of each of two concepts (sensitivity and specificity; positive and negative predictive value) before and after each session; each scale has a possible range of responses from 2 (least favorable) to 10 (most favorable).

†$p < .02$ for comparisons with pre-survey.

of teaching to attend the second session and give open-ended feedback. Her comments corroborated the instructor's observations; with only one or two exceptions, learners' engagement was exceptionally high and "on-task."

Results of the residents' surveys appear in Table 2. Pre- and post-survey differences in attitudes toward the utility of sensitivity and specificity or positive and negative predictive value revealed statistically significant and educationally meaningful increases in favorable attitudes toward both content areas. On the post-survey, the residents reported their interest and engagement as high (8.5 ± 1.6).

DISCUSSION

The high levels of learner engagement and significant effects on residents' attitudes that we observed in the study just described and in other teaching exercises at Baylor lead us to conclude that team learning may be a powerful pedagogic tool in medical education and warrants further study. We feel that the strength of team learning is twofold. First, the combination of small- and large-group dynamics allows the teacher to foster a high degree of interaction among learners while retaining control over session content and delivery. Second, the process of requiring small groups to work on a task and then defend their answers to other groups who have worked on the same task fosters ownership and enthusiasm for the lecture content among the learners. Since team learning is a method intended for large groups (teacher–student ratio higher than 1:7), the ability to foster active learning through small-group activities *within the large-group setting* makes it particularly attractive in the current atmosphere of diminishing faculty resources for teaching.

In teaching the paradigm of evidence-based medicine, team learning may complement other teaching strategies, such as evidence-based journal clubs and evidence-based morning reports.[7–10] Our results suggest that team learning may help to strengthen the attitudinal and cognitive foundation upon which these teaching strategies are based.

Since our study represents only a field test of team learning, our results are limited by a non-random sample of learners, absence of a comparison group taught by traditional methods, and absence of long-term and performance-based outcome measures. However, we hope that our preliminary experiences at Baylor, including the results of this field test, will stimulate others to experiment with team learning in a variety of teaching venues and content areas in medical education. Educators at Baylor plan future controlled studies of the effectiveness of this approach in achieving long-term educational outcomes in the field of evidence-based medicine. Like problem-based learning, team learning may prove to be a teaching strategy that, if successfully implemented, can lead to effective undergraduate and graduate medical education using active learning strategies.

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REFERENCES

1. Michaelsen LK, Black RH. Building learning teams: the key to harnessing the power of small groups in higher education. In: Kadel S, Keeher J (eds). Collaborative Learning: A Sourcebook for Higher Education. Vol. 2. State College, PA: National Center for Teaching, Learning, and Assessment, 1994.
2. Michaelsen LK, Fink LD, Knight A. Designing effective group activities: lessons for classroom teaching and faculty development. In: DeZure D (ed). To Improve the Academy: Resources for Faculty, Instructional, and Organizational Development. Stillwater, OK: New Forums Press, 1997.
3. Michaelsen LK, Black RH, Fink LD. What every faculty developer needs to know about learning groups. In: DeZure D (ed). To Improve the Academy: Resources for Faculty, Instructional, and Organizational Development. Stillwater, OK: New Forums Press, 1997.
4. Johnson DW, Johnson RT, Smith KA. Constructive controversy. Change. 2000;32:29–37.
5. Tomlin Z, Humphrey C, Rogers S. General practitioners' perceptions of effective health care. BMJ. 1999;318:1532–5.
6. McAlister FA, Graham I, Karr GW, Laupacis A. Evidence-based medicine and the practicing clinician. J Gen Intern Med. 1999;14:236–42.
7. Elnicki DM, Halperin AK, Shockcor WT, Aronoff SC. Multidisciplinary evidence-based journal clubs: curriculum design and participants' reactions. Am J Med Sci. 1999;317:243–6.
8. Green ML. Evidence-based medicine training in internal medicine residency programs: a national survey. J Gen Intern Med. 2000;15:129–33.
9. Green ML, Ellis PJ. Impact of an evidence-based medicine curriculum based on adult learning theory. J Gen Intern Med. 1997;12:742–50.
10. Reilly B, Lemon M. Evidence-based morning report: a popular new format in a large teaching hospital. Am J Med. 1997;103:419–26.

APPENDIX A

Handout Given to Learners at the Beginning of the Session

Learning objectives

1. Define and understand the concepts of sensitivity and specificity.
2. Define and understand the concepts of positive and negative predictive value.
3. Understand the concept of prevalence and if/how it affects the above items.
4. Be able to have a feel for the usefulness of the information that a test gives in a particular situation.

Some definitions (in words)

Sensitivity—"Out of all the people who have the disease, this is the proportion who test positive."

Specificity—"Out of all the people who don't have the disease, this is the proportion who test negative."

Positive predictive value—"Out of all the people who test positive, this is the proportion who actually have the disease."

Negative predictive value—"Out of all the people who test negative, this is the proportion who actually don't have the disease."

Some definitions (not in words)

		DISEASE: Present	DISEASE: Absent
TEST	Positive	a	b
	Negative	c	d
		e = (a + c)	f = (b + d)

N = total number in the population

Prevalance = e/N
Sensitivity = a/(a + c)
Specificity = d/(b + d)
Positive predictive value = a/(a + b)
Negative predictive value = d/(c + d)

APPENDIX B

Small-group Tasks in Team-learning Sessions

First Task

Decide with your group which statements are correct. Your group should reach a consensus and be prepared to defend its answers:

1. Tests with high sensitivity are good for detecting disease.
2. Sensitivity: "The chances that a test is negative when the disease isn't there."
3. Specificity: D/(C + D)

		TEST: Positive	TEST: Negative
	Present	A	B
DISEASE	Absent	C	D

4. If a test has a high sensitivity and specificity, then it's a useful test.

Second Task

Decide with your group which statements are correct. Your group should reach a consensus and be prepared to defend its answers.

1. Post-test probability is the same thing as positive/negative predictive value.
2. If the sensitivity is high, the positive predictive value will be high.
3. If the prevalence is low, the negative predictive value will be high.
4. Positive and negative predictive values tell you whether or not the disease is there.

UNIVERSITY of CALIFORNIA
SAN DIEGO
SCHOOL OF MEDICINE
OFFICE of EDUCATIONAL
DEVELOPMENT and EVALUATION

CoursEval 3

Demo Evaluation of Course & Faculty (Year 2005)

Course Information

Course Name: **Demo101 - CoursEval Demonstration Course**

Department: **Demonstration**

Director: **Dr. Deborah Demo**

Note: Questions marked with * must be answered.

SOM 101 Demonstration Course

Welcome to UCSD SOM's on-line evaluation system. This survey is a evaluation of course and faculty for 2005 and will take just a few moments of your time. Click on the appropriate buttons/circles for each question. Space for qualitative comments is available at the end.

Please answer the following questions per the instructions and in a constructive and professional manner.

Use the **"Save Progress"** button 

as a 'save as you go option. It allows you to save what you have entered and continue or exit the evaluation and return to finish the evaluation at another time.

This evaluation is anonymous

Course and Course Components

Please Rate the Course by answering each question using a scale of 1 = Strongly Disagree and 5 = Strongly Agree.

Communication

1) The goals and objectives were made clear to me at the beginning. *

○ Strongly Disagree ○ Disagree ○ Undecided ○ Agree ○ Strongly Agree.

2) The structure and organization were made clear to me at the beginning.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

3) The grading method was made clear to me at the beginning.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

4) There was appropriate communication between the course director and the students throughout the course.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

5) There was appropriate communication between the course instructor/course coordinator and the students throughout the course.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

Organization

6) The course seemed well organized.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

7) The sequencing of the topics facilitated learning the material.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

8) The percentage of time devoted to each of the various components (for example, lectures, clinical correlations, small group sessions, and laboratory sessions) was appropriate for and facilitated learning of the material.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

9) Course elements (such as individual lectures and laboratory sessions) started and finished on time.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

Integration

10) There was appropriate coordination between the lectures.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

11) There was appropriate coordination between the course's components (for example, lectures, clinical correlations, laboratory sessions).

Strongly Disagree Disagree Undecided Agree Strongly Agree.

12) The examinations appropriately tested my knowledge of the content presented.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

13) There was appropriate coordination between this course and other portions of the curriculum.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

Content

14) The content seemed relevant to my professional training.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

15) The amount of material presented was appropriate for the time allotted.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

16) The course was taught at the appropriate level for my background.

Strongly Disagree Disagree Undecided Agree Strongly Agree.

Overall

17) Comments:

Faculty - Lecturer Questions
Demo, Dan

Lecture 1

Please evaluate your lecturers. For each item, answer the question **"How satisfied were you with this lecturer's ability in each of the following domains of evaluation?"**

When you evaluate your lecturers.
Communication includes whether the lecturer was enthusiastic about the subject matter, was audible and understandable, proceeded at the proper pace, was responsive to student questions, and had effective audiovisual materials.

Organization includes whether the lecturer started and stopped on time, had an understandable flow of concepts, and appropriately emphasized the main points.
Integration includes whether the lecture was appropriately coordinated with the syllabus materials, other handouts, and audiovisual materials; with previous and subsequent lectures; and with other segments of the course.
Content includes whether the material was up-to-date, relevant, and appropriate for your background, and whether there was an appropriate amount of content and level of detail for the time allotted.
Overall includes the overall effectiveness of this lecturer as a teacher, how well the lecturer facilitated your learning the material, and whether you would like to have this lecturer again.

1) Communication

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

2) Organization

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

3) Integration

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

4) Content

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

5) Overall

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

6) Written comments:

Lecture 2

Please evaluate your lecturers. For each item, answer the question **"How satisfied were you with this lecturer's ability in each of the following domains of evaluation?"**

When you evaluate your lecturers.
Communication includes whether the lecturer was enthusiastic about the subject matter, was audible and understandable, proceeded at the proper pace, was responsive to student questions, and had effective audiovisual materials.
Organization includes whether the lecturer started and stopped on time, had an understandable flow of concepts, and appropriately emphasized the main points.
Integration includes whether the lecture was appropriately coordinated with the syllabus materials, other handouts, and audiovisual materials; with previous and subsequent lectures; and with other segments of the course.
Content includes whether the material was up-to-date, relevant, and appropriate for your background, and whether there was an appropriate amount of content and level of detail for the time allotted.
Overall includes the overall effectiveness of this lecturer as a teacher, how well the lecturer facilitated your learning the material, and whether you would like to have this lecturer again.

1) Communication

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

2) Organization

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

3) Integration

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

4) Content

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

5) Overall

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

6) Written comments:

Faculty - Lecturer Questions
Demo, David

Lecture 3

Please evaluate your lecturers. For each item, answer the question **"How satisfied were you with this lecturer's ability in each of the following domains of evaluation?"**

When you evaluate your lecturers.
Communication includes whether the lecturer was enthusiastic about the subject matter, was audible and understandable, proceeded at the proper pace, was responsive to student questions, and had effective audiovisual materials.
Organization includes whether the lecturer started and stopped on time, had an understandable flow of concepts, and appropriately emphasized the main points.
Integration includes whether the lecture was appropriately coordinated with the syllabus materials, other handouts, and audiovisual materials; with previous and subsequent lectures; and with other segments of the course.
Content includes whether the material was up-to-date, relevant, and appropriate for your background, and whether there was an appropriate amount of content and level of detail for the time allotted.
Overall includes the overall effectiveness of this lecturer as a teacher, how well the lecturer facilitated your learning the material, and whether you would like to have this lecturer again.

1) Communication

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

2) Organization

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

3) Integration

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

4) Content

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

5) Overall

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

6) Written comments:

Faculty - Lecturer Questions
Demo, Dawn

Lecture 4

Please evaluate your lecturers. For each item, answer the question **"How satisfied were you with this lecturer's ability in each of the following domains of evaluation?"**

When you evaluate your lecturers.
Communication includes whether the lecturer was enthusiastic about the subject matter, was audible and understandable, proceeded at the proper pace, was responsive to student questions, and had effective audiovisual materials.
Organization includes whether the lecturer started and stopped on time, had an understandable flow of concepts, and appropriately emphasized the main points.
Integration includes whether the lecture was appropriately coordinated with the syllabus materials, other handouts, and audiovisual materials; with previous and subsequent lectures; and with other segments of the course.
Content includes whether the material was up-to-date, relevant, and appropriate for your background, and whether there was an appropriate amount of content and level of detail for the time allotted.
Overall includes the overall effectiveness of this lecturer as a teacher, how well the lecturer facilitated your learning the material, and whether you would like to have this lecturer again.

1) Communication

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

2) Organization

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

3) Integration

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

4) Content

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

5) Overall

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

6) Written comments:

Faculty - Lecturer Questions
Demo, Dean

Lecture 5

Please evaluate your lecturers. For each item, answer the question **"How satisfied were you with this lecturer's ability in each of the following domains of evaluation?"**

When you evaluate your lecturers.
Communication includes whether the lecturer was enthusiastic about the subject matter, was audible and understandable, proceeded at the proper pace, was responsive to student questions, and had effective audiovisual materials.
Organization includes whether the lecturer started and stopped on time, had an understandable flow of concepts, and appropriately emphasized the main points.
Integration includes whether the lecture was appropriately coordinated with the syllabus materials, other handouts, and audiovisual materials; with previous and subsequent lectures; and with other segments of the course.
Content includes whether the material was up-to-date, relevant, and appropriate for your background, and whether there was an appropriate amount of content and level of detail for the time allotted.
Overall includes the overall effectiveness of this lecturer as a teacher, how well the lecturer facilitated your learning the material, and whether you would like to have this lecturer again.

1) Communication

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

2) Organization

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

3) Integration

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

4) Content

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

5) Overall

Very Dissatisfied Dissatisfied Neutral Satisfied Very Satisfied

6) Written comments:

Faculty - Lecturer Questions
Demo, Deborah

Lecture 6

Please evaluate your lecturers. For each item, answer the question **"How satisfied were you with this lecturer's ability in each of the following domains of evaluation?"**

When you evaluate your lecturers.
Communication includes whether the lecturer was enthusiastic about the subject matter, was audible and understandable, proceeded at the proper pace, was responsive to student questions, and had effective audiovisual materials.
Organization includes whether the lecturer started and stopped on time, had an understandable flow of concepts, and appropriately emphasized the main points.
Integration includes whether the lecture was appropriately coordinated with the syllabus materials, other handouts, and audiovisual materials; with previous and subsequent lectures; and with other segments of the course.
Content includes whether the material was up-to-date, relevant, and appropriate for

Overall includes the overall effectiveness of this lecturer as a teacher, how well the lecturer facilitated your learning the material, and whether you would like to have this lecturer again.

1) Communication

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

2) Organization

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

3) Integration

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

4) Content

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

5) Overall

○ Very Dissatisfied ○ Dissatisfied ○ Neutral ○ Satisfied ○ Very Satisfied

6) Written comments:

Only use the **"Submit Survey"** button if the evaluation is complete. Once submitted, you will not be able to return to this evaluation.

Thank you. Your time and effort is appreciated!

Close Preview

General Competencies

At its February 1999 meeting, the ACGME endorsed general competencies for residents in the areas of:

- **patient care,**
- **medical knowledge,**
- **practice-based learning and improvement, and**
- **interpersonal and communication skills,**
- **professionalism,**
- **systems-based practice.**

Identification of general competencies is the first step in a long-term effort designed to emphasize educational outcome assessment in residency programs and in the accreditation process. During the next several years, the ACGME's Residency Review and Institutional Review Committees will incorporate the general competencies into their Requirements. The following statements will be used as a basis for future Requirements language. If you have any questions, comments and other requests for assistance, please address them to outcomes@acgme.org.

ACGME GENERAL COMPETENCIES Vers. 1.3
(9.28.99)

The residency program must require its residents to develop the competencies in the 6 areas below to the level expected of a new practitioner. Toward this end, programs must define the specific knowledge, skills, and attitudes required and provide educational experiences as needed in order for their residents to demonstrate the competencies.

PATIENT CARE

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. Residents are expected to:

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate information about their patients
- make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
- develop and carry out patient management plans
- counsel and educate patients and their families
- use information technology to support patient care decisions and patient education
- perform competently all medical and invasive procedures considered essential for the area of practice
- provide health care services aimed at preventing health problems or maintaining health
- work with health care professionals, including those from other disciplines, to provide patient-focused care

MEDICAL KNOWLEDGE

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care. Residents are expected to:

- demonstrate an investigatory and analytic thinking approach to clinical situations
- know and apply the basic and clinically supportive sciences which are appropriate to their discipline

PRACTICE-BASED LEARNING AND IMPROVEMENT

Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:

- analyze practice experience and perform practice-based improvement activities using a systematic methodology
- locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems
- obtain and use information about their own population of patients and the larger population from which their patients are drawn
- apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness
- use information technology to manage information, access on-line medical information; and support their own education
- facilitate the learning of students and other health care professionals

INTERPERSONAL AND COMMUNICATION SKILLS

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, their patients families, and professional associates. Residents are expected to:

- create and sustain a therapeutic and ethically sound relationship with patients
- use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills
- work effectively with others as a member or leader of a health care team or other professional group

PROFESSIONALISM

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Residents are expected to:

- demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supercedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development
- demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practices
- demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities

SYSTEMS-BASED PRACTICE

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

- understand how their patient care and other professional practices affect other health care professionals, the health care organization, and the larger society and how these elements of the system affect their own practice
- know how types of medical practice and delivery systems differ from one another, including methods of controlling health care costs and allocating resources
- practice cost-effective health care and resource allocation that does not compromise quality of care
- advocate for quality patient care and assist patients in dealing with system complexities
- know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance

Optional Post-Program CME Assignment

For 2 additional Category 1 CME credits, the following exercise can be done:

Design your best lecture as an active learning program. When you are done, send it to sharonk@ucsd.edu as an attachment, or mail it to:

Attn: Sharon Kang
Office of Continuing Medical Education
9500 Gilman Drive, Evergreen 0617
La Jolla, CA 92093-0617

This assignment must be turned in by _____ to receive the credits.