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General Guidelines. All manuscripts must be submitted on diskette (using preferably MS Word or Word Perfect) along with one hard copy on 8-1/2 by 11 inch paper with consecutively numbered pages. Margins should be at least one inch on all sides. Manuscript titles must not run more than two journal lines, and all articles should contain sub-headings of two or three words each. Footnotes should be kept to a minimum and should be no more than two or three lines in length. When references are needed, they should be restricted to pertinent papers, listed in order of citation, numbered in sequence and cited by superscript numerals within the text. The title page should include a) concise title, b) first name, middle initial and last name of each author and his or her highest degree, c) institutional affiliation of each author and d) acknowledgments. The number of listed authors is limited to seven. Authors should follow the specific guidelines given below on style format. If there are any additional questions, the editor-in-chief should be contacted before the manuscript is submitted. Each article should include the title, the author's name, address and telephone number.

Specific Guidelines on Format of Major Articles. *Major Articles* are not limited to any particular number of pages, but must be accompanied by an abstract of no more than 200 words. Each *Major Article* must also be accompanied by at least three references. In general, the manuscript should adhere to the following format: *Abstract*, *Introduction*, *Materials and/or Methods/Results and/or Discussion*, *Summary and/or Conclusion and References*. When listing each journal reference, include, in order: author (last name and initials), title, journal abbreviation, volume number, inclusive page numbers and year; book references should also include editors, edition, publisher and place of publication. Reference for journal abbreviations is the *Index Medicus*. Tables should be numbered with Roman numerals and titled; figures should be numbered with Arabic numerals and accompanied by legends. Topics for *Major Articles* may include: Data of research studies in any area of pathology education, and data of educational studies that involve in-depth work with new technologies and that have a direct bearing on the implementation, augmentation and evaluation of pathology education.

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EDITOR'S NOTES

Beginning with the next issue of Pathology Education, we will have a new editor, Charles Hitchcock, M.D. of the Department of Pathology at Ohio State University. Chuck is enthusiastic about GRIPE, its aims and attitudes of its members toward medical education. We will share duties on the next one or two issues, and then Chuck will have the journal in his capable hands.

In recent years, we have changed both the format and name of the journal from the previous Bulletin of Pathology Education. It has been a privilege to have taken part in those changes. My best wishes to Dr. Hitchcock as our new editor!

The present issue deals primarily with what our pathology education community is thinking about the curriculum. The proceedings of the recent combined Association of Pathology Chairs and Group for Research in Pathology Education are found between these pages. Read over the results of these joint deliberations by several working groups and think about them. How can we use this information in our own teaching?

M.D.

Education

James R. Newland,

Editor, Pathology

FUTURE MEETINGS FOR GRIPE

Winter 2000

January 19-22, 2000
Tulane University
New Orleans, Louisiana

Summer 2000

June 21-24, 2000
Indiana University
Indianapolis, Indiana

LETTER FROM THE PRESIDENT

Drs. Fenderson and Damjanov's article in this issue on creating examinations brings to mind some thoughts. A few years ago, my institution decided to have a retreat about our curriculum, so several of us, including department chairs spent two days talking about medical education, especially that during the first two basic science years. We were a mixture of clinicians and basic scientists with differing views on what and how that 'what' should be taught. There was one item that came through clearly despite our differences: Testing drives the curriculum. It seems a simple enough statement, but it is quite true. However, I believe this is a superficiality that reflects the way we teach, and more importantly, the way students learn. We are testing in a way which reflects our teaching and the students' learning.

Probably most pathology programs still use multiple choice questions which are in large part at recall levels. For example, a student may be asked to remember a certain percentage, fact, or other item. Physicians dealing with patients do use isolated facts, but they use them in the process of solving problems. In other words, somewhere along the line, critical thinking must come into the process of patient care. It is difficult to come close to this process in paper examinations, but there is a way we can at least make the students think: Ask problem solving questions! Presently, most of us use computer-scored examinations, so we must make the multiple choice question do. Information on how to write challenging multiple choice questions is available from the National Boards of Medical Examiners on their web site: <http://www.nbme.org/>. Click onto "Publications," and this will lead you to the Item Writing Manual by Drs. Susan Case and David Swanson of NBME that can be downloaded free of charge. This manual is in its second edition and is excellent. I urge each of you to obtain a copy, read it, and use it.

But there is more to changing the way we teach and learn than just writing higher taxonomic multiple choice items: Questions should follow from well-written learning objectives which themselves require problem solving rather than simple fact recall. If you want help in writing good objectives, you have a resource right under your nose: The program director of your Medical Technology program. Medical Technology programs for undergraduate students are required to have comprehensive objectives in each subject. The program directors and their faculty can help you in writing objectives for your medical students.

There is still more to critical thinking and problem solving in the curriculum, and this is the hardest of all: It requires fundamental change in faculty outlook to medical education. Students need to be probed in a Socratic fashion by faculty to get beneath the superficial layers of a problem and beyond simple recall of fact. Expectations of the level of student performance must be raised. Faculty need to develop and carry out their own critical thinking in the process of medical education. This is an attitude that must come from our own GRPE organization, institutional top administrators, department chairs, and faculty. How can this daunting task be accomplished? It can start with one enthusiastic individual in a department and spread to other faculty, department chairs, and top administration. The expectation of excellence and excellence itself can breed more excellence. I urge you to look over the horizon and begin the change within your own sphere of influence.

James R. Newland, M.D.

A MEDICAL TECHNOLOGY INSTRUCTOR'S EXPERIENCES WITH WEB BASED INSTRUCTION

Carol A. Larson MSEd, MT(ASCP)

The World Wide Web (WWW) is moving to the forefront as an instructional tool for course delivery.

The UNMC Division of Medical Technology quickly recognized the value of using the WWW to reach an otherwise unreachable audience and to

enhance the instructional materials already in use. I would like to share some of my research on the topic of web-based instruction and my personal experiences with web-based instruction from a developer's, instructor's and student's viewpoints.

Background

As an Assistant Professor in UNMC's Division of Medical Technology, my major responsibilities include coordinating the instruction of rural-based medical technology students, facilitating small group case study discussions, developing computer assisted instructional materials and maintaining the program's web pages.

Several of the medical technology program courses are delivered by the Nebraska Educational Television NEB*SAT satellite system, the Nebraska Video Conference System (a state-operated T1 video conferencing system) or web-based instruction.

While completing my master's degree in education with emphasis on Instructional Technology at the University of Nebraska at Kearney and as Director of the Rural Health Education Distance Learning Research Center at Kearney, I have had numerous opportunities to **Analysis Phase:** The planning process for development of web-based instruction requires a needs assessment to ask specific questions (Table 1)

provide leadership and support in these distance learning methodologies including computer-assisted instruction and the World Wide Web. One particularly valuable experience was presenting a grant-supported workshop on the design and development of web-based instruction for seventy-six participants in five different locations in Nebraska.

Developing a Web-Based Course

Developing a web-based course involved 5 phases (refer to Table I). Planning and analysis is the focus of the first phase (analysis). The middle 3 phases (design, construction, and implementation) focus on the development of the course. The last phase (operational) focuses on putting the course into use.

Planning and Analysis

and address specific issues such as student access to the WWW, hardware and software considerations, capabilities of the server, security,

training, and policies and procedures of the institution. Input from colleagues, administration, students and support staff must be considered in this phase.

Building a team of key players has been essential in preparing for the next phases of development. In several cases, I have found it very valuable to involve a content expert, an instructional designer, and technology support personnel such as a programmer or web master. A timeline spelling out who will carry out what tasks and when each task is to be completed is prepared. Keeping in mind the strengths of WWW instruction over a traditional lecture (Table II), the team then begins the design phase of the course.

Design Phase

Overall design: In the design phase one looks at the overall issues (the macroscopic portion of the design phase) and the specific details of each computer screen (the microscopic portion). In the macroscopic portion, the general layout of the web pages and how the students will navigate through these pages is determined. Options to consider include: 1) a linear approach in which the instructor controls the students' progress, 2) a hierarchical approach in which students can select from a menu the section they want to focus on, but the instructor still has some control of sequence; and 3) an unstructured approach in which the student has total control of what to do next and can "branch" to any location. A sample layout (or visual table of contents) for each option is provided in Figure 1.

Features that help the students remain oriented as they "navigate" or move through the website include: Menus, Maps, Navigational Buttons (next, previous, main) or Search options. It is important to make sure the student has no more than three clicks to get to any webpage from another webpage. This enables students to focus on content rather than on how to get to the next page.

Details of design: The microscopic portion of the design phase involves creating a Storyboard for every page (Figure 2). Templates are very useful in identifying which items will appear on every page. Storyboards for each webpage take the template and drawn out or "dump" the content, links and multimedia into it.

Once each webpage has its own storyboard, the technical staff who will build the webpages can easily understand what each page is to look like, and will know how to link the pages together. The more detailed the storyboards, the easier the actual building of the webpages. Consistency is the real key.

Construction Phase

Once the design phase is completed, the construction phase begins. This involves working with the technical experts (computer programmers or webmasters) to write the computer coding (Hypertext Markup Language, called HTML) for the webpages. I do

most of this myself using web and text editors, but on occasion call on UNMC's Computing Services staff for assistance.

When a lot of time is spent in the analysis and design phases (80-90% of the total time involved), the construction phase takes very little time (preferably only 10%), and the final product is more likely to succeed. If the planning phase is skipped, the end product will be full of "bugs" and will not meet the intended needs. So, as tempting as it may be to plunge right in, it's better to take the time up front to analyze and design your webpages before you ever sit down in front of the computer.

Implementation Phase

In the implementation phase, the newly constructed webpages are tested. The webmaster loads the new code (HTML) onto the server and the instructor verifies that the website functions as intended. It is always wise to pilot test the course before reaching the operational phase. Involve a content expert, other instructors and students for the pilot test and utilize an evaluation tool. From experience I have received very good feedback when pilot testing that has greatly improved the course. The times I have not found the time to do a pilot, revisions after the course is in use have been difficult.

Before the website is introduced, the faculty and students will require

The WWW is constantly changing, with new servers being brought on line and

training. Students and faculty have a wide range of skills with respect to computers and the WWW. Never assume anyone knows how to use technology. Training is critical.

Additional questions relating to the replacement of the "old" course with the new must be addressed. How will the new "lesson" or "course" be put into use? Will you totally drop the old and start using the new, or will you transition into using the new by trying it out with a small group of students while using the old method with the rest of the students?

Operational Phase

The final phase, and just as important as the others, is the **operational phase**. This is the stage when the website is incorporated into the curriculum and put to use. Two key issues are addressed in the operational phase. The first issue is maintenance of the website. Make sure that the website is functioning properly and fix any "bugs" that may be encountered. The easiest way to do this is to have the students report any problems encountered. Evaluations should contain specific questions that relate to the technology being used and any difficulties encountered.

The second issue is making sure that the information on each webpage is current. Once your webpages are "out there," you cannot just walk away from them. Links to other sites may work now but tomorrow may no longer exist.

webpages being moved to different directories or deleted altogether. Your

own webpages can be easily updated with new information at any time.

Teaching a Web-Based Course

Currently, I am facilitating the Division of Medical Technology's Advanced Management and Information Technology course (part of the Add-A-Competency Federal grant). We use a variety of instructional methods to reach the 90 registrants who are spread out across the state of Nebraska. Lectures have been provided using live interactive video-conferencing, videotapes, audiotapes, and streaming video and audio via the UNMC Intranet.

Class discussions, which I facilitate, have been conducted in an asynchronous manner using WebBoard⁵. I found it necessary to divide the 90 participants into 8 groups to help in the management of messages being posted by each group. It is easier for already busy professionals to read a few messages by others in their group than to keep up with a conversation among 90 participants. On the other hand, as the facilitator, I must spend much more time monitoring all 8 groups. I am available by phone or email for those having technical difficulties with WebBoard.

Information accessed on the WWW is used to supplement my traditional courses with assignments (readings, additional resources, drill and practice, and review) from the WWW. Recently, I presented a workshop for the UNMC Division of Medical Technology faculty entitled "Using the Internet, Intranet and Computer Assisted Instruction in Your Curriculum."³ We focused on utilizing websites that are already available via the WWW and incorporating them into the current curriculum. There are

We began the course in October and anticipate completing it the end of April.

The process of getting the course up and running has involved many people who must work as a team. Various MT faculty and staff have lined up speakers, gathered instructional materials, and put together mailings that include a syllabus, lesson handouts, instructional materials (such as video and audio tapes), and informative letters. I am responsible for building the session webpages that contain information about the presenter, objectives, lesson materials, resources, and access to the discussion groups and online evaluation forms. Unfortunately, time has prevented us from planning this entire course in advance, and we are building the course session by session.

The Division of MT is collecting data from each participant's evaluation of each session with respect to delivery methods and participant satisfaction. We are also requesting suggestions and comments on what worked well and what did not work. I look forward to reviewing these evaluations.

Using Existing Materials

numerous websites that are very valuable to clinical laboratory professionals (including pathologists and medical technologists).⁵ It is not always necessary to "reinvent the wheel" by creating new web materials. It is easier to find something that is available already and then put it into the curriculum.

Taking a Web-Based Course

While pursuing my master's degree, I was required in some classes to access the WWW for readings and asynchronous discussions. As a student, I found it very valuable to be able to discuss in more detail what was being taught and discussed during class time. Group projects were often assigned and I utilized email, live chat, faxes and telephone conferences to communicate with my team. Our instructor also required the class to be "paperless" - meaning the syllabus, assignments, discussion, and exams would be accessed electronically. Examinations were emailed to the students and answers were emailed back to the instructor. This method required a lot of work on the instructor's part to grade the exams, but was an effective way of assessing learning.

There is a challenge in communicating through a computer monitor and not in person. It is difficult to pick up on nonverbal cues when you cannot see the other person. But with time, you begin to identify writing styles of different participants and their personalities begin to form. I have also found that, in face-to-face class discussions, I am less likely to ask questions, but using an asynchronous discussion board, I am able to gather my thoughts and express myself more easily.

Summary

As you begin to consider developing your on web-based instruction, I would highly recommend that you follow a process that includes an analysis phase, design phase, construction phase, implementation phase, and operational

phase. These phases overlap somewhat, but the end product is much more likely to meet your needs than if you dive in and construct on the go.

You do not need to present the entire course all at once via the WWW. You may consider starting out by supplementing your traditional course with assignments involving the WWW and gradually transition to using the WWW more fully.

In designing, teaching and taking a web-based course, you will find that this instructional tool has many advantages, along with some disadvantages. Consider the students' needs first. What is the best instructional method for them to attain the best education possible? Is face-to-face interaction necessary? Emphasize the strengths of the WWW over a traditional setting, such as appropriate use of multimedia and interactivity.

There is much to be learned as we all begin to use this new tool for instructional delivery. Share your experiences with others and learn from each other.

Table 1
Web-Based Course Development Phases

PHASE	KEY QUESTIONS AND ISSUES
<i>Analysis</i>	<p><i>What is the best method of course delivery?</i> <i>What need(s) will be met by utilizing the WWW?</i> <i>What benefits will the students, myself and the institution receive?</i> <i>Who is the audience?</i> <i>What is the purpose of my web pages?</i></p>
<i>Design</i>	<p><i>Macroscopic</i> <i>General layout of website</i> <i>Navigational issues, student orientation</i> <i>Microscopic:</i> <i>Storyboard: layout, navigation, text font, spacing, colors,</i> <i>graphics, multimedia, links, and content</i> <i>Be consistent in placement of all items on all pages</i></p>
<i>Construction</i>	<p><i>Utilize storyboards to build webpages</i> <i>Involve technical experts (i.e. programmer and web master)</i> <i>Tools needed: Web editors (i.e. FrontPage, text editors)</i></p>
<i>Implementation</i>	<p><i>Training issues</i> <i>computer skills</i> <i>software / web browser skills</i> <i>orientation to course layout</i> <i>Pilot studies</i> <i>How will the new "lesson" or "course" be put into use?</i> <i>totally drop the old and start using the new, or</i> <i>transition into using the new by using it with one group of</i> <i>students while using the old method with another group</i></p>
Operational	<p><i>Maintaining website – Does it function properly?</i> <i>Do all the links work?</i> <i>Is the information current and accurate?</i> <i>Evaluations conducted regularly</i></p>

Table 2

**Strengths and Weaknesses of Web-Based Instruction
Versus Traditional Lecture**

	WEB-BASED INSTRUCTION	TRADITIONAL LECTURE
STRENGTHS	<p><i>ABILITY TO USE MULTIMEDIA TO ENHANCE TEXTUAL/SPOKEN CONTENT</i></p> <p><i>STUDENTS CAN BETTER VISUALIZE CONTENT AND INTERACT WITH IT</i></p> <p><i>SELF-PACED</i></p> <p><i>DRILL AND PRACTICE, SIMULATIONS, TUTORIALS, PROBLEM-SOLVING</i></p>	<p><i>FACE-TO-FACE INTERACTION WITH INSTRUCTOR AND STUDENTS</i></p> <p><i>NOT RELIANT UPON SELF-MOTIVATION</i></p>
Weaknesses	<p><i>Students will not tolerate reading lengthy text on screen</i></p> <p><i>Graphics that "look nice" but do not serve purpose slow down access time</i></p> <p><i>Bandwidth</i></p>	<p><i>Spoken and text based only limited multimedia</i></p> <p><i>· Meet same time, same place</i></p>

FIGURE 1

EXAMPLES OF VISUAL TABLE OF CONTENTS

FIGURE 2
EXAMPLE OF A STORYBOARD TEMPLATE

REFERENCES

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[HTTP://WWW.UNK.EDU/DEPARTMENTS/RURAL_HEALTH/](http://www.unk.edu/departments/rural_health/)
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 3. USING THE INTERNET, INTRANET AND COMPUTER ASSISTED INSTRUCTION IN YOUR CURRICULUM
[HTTP://WWW.UNMC.EDU/ALLIEDHEALTH/RETREAT98/RETREAT98.HTML](http://www.unmc.edu/alliedhealth/retreat98/retreat98.html)

 4. UNMC DIVISION OF MEDICAL TECHNOLOGY – WWW RESOURCE LIST [HTTP://WWW.UNMC.EDU/ALLIEDHEALTH/LABWWW.HTML](http://www.unmc.edu/alliedhealth/labwww.html)

 5. WebBOARD – WEB CONFERENCING SOFTWARE, O'REILLY SOFTWARE, O'REILLY & ASSOCIATES, SEBASTOPOL, CA
[HTTP://WEBBOARD.OREILLY.COM](http://webboard.oreilly.com)
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CONTINUED SURVIVAL OF PATHOLOGY LABORATORY IN PATHOLOGY INSTRUCTION IN U.S. MEDICAL SCHOOLS

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ALTHOUGH LABORATORY TEACHING HAS BEEN LOSING IMPORTANCE IN THE TEACHING OF SOME BASIC SCIENCES IN THE MEDICAL SCHOOL CURRICULUM, THE PATHOLOGY LABORATORY CONTINUES TO SURVIVE AS A SIGNIFICANT RESOURCE IN PATHOLOGY INSTRUCTION. HOWEVER, THE FORM, VENUE, AND EMPHASIS OF PATHOLOGY LABORATORY INSTRUCTION HAVE CHANGED IN MANY MEDICAL SCHOOLS. A RECENT SURVEY OF PATHOLOGY TEACHING IN U.S. MEDICAL SCHOOLS REVEALS THAT THE MAJORITY OF

SCHOOLS CONTINUE TO USE GROSS AND MICROSCOPIC PATHOLOGY MATERIAL IN ALL OR SOME PORTIONS OF THEIR CURRICULA. THERE IS A WIDE SPECTRUM IN THE MANNER THE LABORATORY MATERIAL IS UTILIZED. THE DATA INDICATE THAT WHILE NEWER TECHNOLOGIES OF COMPUTER ASSISTED INSTRUCTION HAVE BEEN INCORPORATED IN LABORATORY INSTRUCTION, TRADITIONAL MEANS, E.G., USE OF GROSS & MICROSCOPIC MATERIALS CONTINUE TO BE USED AT LEAST IN PART IN THE MAJORITY OF SCHOOLS.

INTRODUCTION

CONSIDERING THE FACT THAT A VARIETY OF FACTORS LED TO RE-EVALUATION AND MODIFICATION OF TEACHING PROGRAMS IN MOST MEDICAL SCHOOLS IN THE PAST DECADE, A NATIONWIDE SURVEY WAS CONDUCTED BY DR KUMAR IN 1996/97 TO OBTAIN SYSTEMATIC INFORMATION ABOUT PATHOLOGY INSTRUCTION. THE OVERALL RESULTS OF THAT STUDY WERE PUBLISHED RECENTLY (1). THE DATA SPECIFICALLY PERTAINING TO THE LABORATORY INSTRUCTION HAVE SINCE BEEN ANALYZED FURTHER AND ARE REPORTED HERE.

THE PREVIOUS IN-DEPTH ANALYSIS OF PATHOLOGY INSTRUCTION WAS

CONDUCTED BY DAVIS AND MISTRY IN 1986 (2).

THE FACTORS WHICH PARTICULARLY AFFECT PATHOLOGY LABORATORY INSTRUCTION INCLUDE ADVANCES IN COMPUTER TECHNOLOGY, REDUCED AVAILABILITY OF SURGICAL AND AUTOPSY MATERIAL, AND A PERCEPTION OF REDUCED NEED FOR STUDY OF MORPHOLOGIC MATERIAL FOR STUDENTS DUE TO PUSH TOWARD PRIMARY CARE. WITH THESE FACTORS IN MIND, ANALYSIS OF DATA WAS CARRIED OUT TO EXAMINE THE CURRENT STATUS OF LABORATORY INSTRUCTION IN ANATOMIC AND CLINICAL PATHOLOGY.

MATERIALS AND METHODS

ALL MEDICAL SCHOOLS IN THE U.S. WERE SURVEYED IN 1996/97 TO DETERMINE HOW PATHOLOGY IS BEING TAUGHT. THE DETAILS OF THE METHODS AND OVERALL RESULTS OF DATA OBTAINED FROM 89 SCHOOLS (71%) WERE REPORTED EARLIER (1). THE DATA PERTAINING TO LABORATORY INSTRUCTION HAVE BEEN ANALYZED FURTHER AND ARE DESCRIBED HERE.

INFORMATION RELATED TO LABORATORY TEACHING HOURS WAS AVAILABLE FROM 84 SCHOOLS, AND FOR MODALITIES USED IN THE LABORATORY FROM 81 SCHOOLS.

THE QUESTIONS SPECIFICALLY RELATING TO LABORATORY INSTRUCTION ENQUIRED ABOUT THE NUMBER OF LABORATORY HOURS AND THE USE OF GROSS SPECIMENS (FORMALIN-FIXED OR PLASTINATED), GLASS SLIDES, COMPUTER PROGRAMS, CASE STUDIES, AND CLINICO-PATHOLOGIC CORRELATION FOR EACH TOPIC IN PATHOLOGY. WITH REGARD TO CLINICAL PATHOLOGY, THE QUESTIONS RELATED TO THE USE OF "WET" LABS (I.E., DEMONSTRATION VS. HANDS ON EXPERIENCE BY STUDENTS), "DRY" LABS (I.E., STUDY OF PREPARED SLIDES), VIDEO TAPES, AND COMPUTER PROGRAMS IN EACH AREA. THE MEANS USED FOR STUDENT EVALUATION AND THE FREQUENCY OF TESTING WERE ALSO ENQUIRED ABOUT.

THE SOFTWARE MICROSOFT EXCEL^R WAS USED FOR DATA ANALYSIS. ALL PERCENTAGES GIVEN FOR THE MODALITIES USED IN LABORATORY TEACHING INDICATE THE PERCENT FIGURE RELATIVE TO THE TOTAL NUMBER OF SCHOOLS PROVIDING INFORMATION, I.E., 81 SCHOOLS. WRITTEN COMMENTS WERE OBTAINED REGARDING STRENGTHS

AND WEAKNESSES OF THE INDIVIDUAL CURRICULA. THE RESPONDENTS WERE ALSO ASKED TO COMMENT ON WHAT SHOULD BE EMPHASIZED OR DE-EMPHASIZED IN PATHOLOGY INSTRUCTION. ALL WRITTEN COMMENTS PERTAINING TO LABORATORY INSTRUCTION WERE CATEGORIZED SEPARATELY.

RESULTS

THERE IS A WIDE SPECTRUM IN THE EXTENT OF USE OF VARIOUS TEACHING MODALITIES IN PATHOLOGY INSTRUCTION (1). AS REPORTED EARLIER, THE INSTRUCTION COULD BE CATEGORIZED INTO FOUR MAJOR FORMATS: TRADITIONAL (21% SCHOOLS), ENHANCED TRADITIONAL (53% SCHOOLS), HYBRID (10% SCHOOLS), AND CASE ORIENTED OR PREDOMINANTLY PROBLEM BASED (16%). THERE IS ALSO A VERY SMALL NUMBER OF ENTIRELY PROBLEM BASED SCHOOLS.

LABORATORY INSTRUCTION HOURS

THE TEACHING HOURS FOR THE LABORATORY WERE CATEGORIZED SEPARATELY FOR EACH OF THE ABOVE FORMATS OF INSTRUCTION AND ARE SHOWN IN FIG. 1 AND TABLE 1. THE OVERALL NUMBER OF HOURS OF LABORATORY INSTRUCTION IN ALL FORMATS COMBINED RANGE FROM 1 TO 228, MEAN = 60 AND MEDIAN = 53.

FURTHER BREAKDOWN OF LABORATORY HOURS IN TERMS OF GENERAL PATHOLOGY, SYSTEMIC PATHOLOGY AND CLINICAL PATHOLOGY FOR EACH FORMAT, AS IDENTIFIABLE, IS SHOWN IN FIG. 2.

THE MEAN NUMBER OF HOURS FOR ALL FORMATS COMBINED IS 17 FOR GENERAL PATHOLOGY, 40 FOR SYSTEMIC

PATHOLOGY, AND 4 FOR CLINICAL PATHOLOGY.

VARIOUS MODALITIES USED IN
LABORATORY INSTRUCTION

AS SHOWN IN TABLE 2, FORMALIN-FIXED GROSS SPECIMENS AND GLASS SLIDES ARE UTILIZED EITHER FULLY OR IN PART, IN ONE OR MORE AREAS OF PATHOLOGY IN 68 SCHOOLS (84%). PLASTINATED SPECIMENS ARE USED IN 20 SCHOOLS (25%) CLINICO-PATHOLOGIC CONFERENCES AND CASE STUDIES ARE USED BY 45 (56%) AND 48 (59%) SCHOOLS RESPECTIVELY. COMPUTER AIDED INSTRUCTION RELATED TO PATHOLOGY

LABORATORY IS USED BY 35 (43%) SCHOOLS. ALTHOUGH THERE IS A WIDE RANGE OF TOPICS FOR COMPUTER ASSISTED INSTRUCTION, THE ONES USED MOST COMMONLY RELATE TO INFLAMMATION, NEOPLASIA, HEMOSTASIS, AND HEMATOPATHOLOGY. MOST SCHOOLS APPEAR TO USE COMPUTER ASSISTED INSTRUCTION IN A SUPPLEMENTARY MANNER. BREAKDOWN OF THE USE OF ALL OF THE ABOVE MODALITIES FOR GENERAL PATHOLOGY AND SYSTEMIC PATHOLOGY ALONE, OR BOTH IS SHOWN IN TABLE 2.

WRITTEN COMMENTS

THE WRITTEN COMMENTS SPECIFICALLY RELATING TO LABORATORY INSTRUCTION STRENGTHS/WEAKNESSES OF INDIVIDUAL CURRICULA AND OPINIONS REGARDING WHAT SHOULD BE EMPHASIZED/DE-EMPHASIZED CAN BE SUMMARIZED AS FOLLOWS:

STRENGTHS

- HISTOPATHOLOGY LABORATORIES WITH CASE BASED MATERIALS
- CLINICO-PATHOLOGIC CORRELATION

- INTEGRATION OF LABORATORY MATERIAL WITH SMALL GROUP CASE-BASED DISCUSSIONS
- CLINICALLY ORIENTED LABORATORY SESSIONS
- CASES SUPPORTED BY COMPUTER MODULES FOR SELF DIRECTED LEARNING

WEAKNESSES

- REDUCED AVAILABILITY OF GROSS SPECIMENS
- LIMITED/OLD FACILITIES AND LIMITED RESOURCES

- NOT ENOUGH LABORATORY MEDICINE BEING TAUGHT
- LIMITED/OR LACK OF COMPUTER ASSISTED INSTRUCTION (FOR SCHOOLS THAT HAVE NOT DEVELOPED THIS AREA YET)

WHAT SHOULD BE EMPHASIZED:

- USE OF LABORATORY MATERIAL TO ILLUSTRATE CONCEPTS OF DISEASE IN A CASE BASED MANNER WITH CLINICAL RELEVANCE

WHAT SHOULD BE DE-EMPHASIZED:

- MORPHOLOGY OF RARE DISEASES
- MORPHOLOGY FOR ITS OWN SAKE

CONCERNS

- NOT HAVING ADEQUATE TIME FOR TRAINING IN HISTOPATHOLOGIC DIAGNOSIS. STUDENTS MAY NOT LEARN THE DIAGNOSTIC APPROACHES IN SLIDE INTERPRETATION.

DISCUSSION

LABORATORY INSTRUCTION IS UTILIZED IN THE VAST MAJORITY (98%) OF THE RESPONDING SCHOOLS. HOWEVER, THE FORM AND EXTENT TO WHICH IT IS UTILIZED VARIES REMARKABLY FROM ONE SCHOOL TO ANOTHER. FOR THE PURPOSE OF THE PRESENT ANALYSIS, IF A RESPONDENT ANSWERED "YES" FOR LABORATORY USE FOR INSTRUCTION OF ANY TOPIC IN ANY SECTION OF PATHOLOGY, IT WAS COUNTED AS A "YES" RESPONSE FOR THAT SECTION (TABLE 2). ONLY 2% RESPONDING SCHOOLS APPEAR TO HAVE COMPLETELY ELIMINATED LABORATORY INSTRUCTION RELYING

TABLE 1

THE NUMBER OF HOURS DEVOTED TO LABORATORY INSTRUCTION IN COLLEGES WITH DIFFERENT TEACHING FORMATS.

	TRADITIONAL (N = 18)	ENHANCED TRADITIONAL (N = 46)	HYBRID (N = 9)	PREDOM. CASE- ORIENTED/PBL (N = 11*)	ALL (N = 84)
MEAN	73	64	43	35	60
RANGE	12-228	18-184	1-108	1-83	1-228
MEDIAN	74	54	38	37	53

* INCLUDES 4 SCHOOLS THAT USE THIS FORMAT ONLY IN PART 2 OF PATHOLOGY (PART 1 BEING TRADITIONAL).

THE ALTERNATE TRACKS OF "PROBLEM BASED" CURRICULUM IN FOUR RESPONDING SCHOOLS ARE NOT INCLUDED HERE TO AVOID DUPLICATION.

TABLE 2

VARIOUS TEACHING MODALITIES USED IN PATHOLOGY TEACHING LABORATORY. NUMBERS IN EACH COLUMN INDICATE THE NUMBER OF SCHOOLS UTILIZING VARIOUS MODALITIES FULLY, OR IN PART, IN ONE OR MORE AREAS OF GENERAL PATHOLOGY ALONE, SYSTEMIC PATHOLOGY ALONE, OR BOTH, AS INDICATED. N=81				
	GP + SP	GP ONLY	SP ONLY	TOTAL # AND %
GROSS SPECIMENS	57	4	7	68 (84%)
GROSS SPECIMENS	11	4	5	20 (25%)
GLASS SLIDES	56	6	6	68 (84%)
CASE STUDIES	35	4	9	48 (59%)
CPC	30	4	11	45 (56%)
COMPUTER PROGRAMS (SUPPLEMENTAL)	21	6	8	35 (43%)

GP - GENERAL PATHOLOGY, OR PART 1 PATHOLOGY; SP - SYSTEMIC PATHOLOGY, OR PART 2 PATHOLOGY

SOLELY ON COMPUTER PROGRAMS/AND OR PROJECTION SLIDES.

THE OVERALL MEAN NUMBER OF HOURS OF LABORATORY INSTRUCTION (60 HOURS) IN THE PRESENT SURVEY IS LOWER THAN THAT REPORTED IN 1986 (77 HOURS). HOWEVER, THE PERCENT TIME DEVOTED TO LABORATORY USE IS ABOUT THE SAME AS IN 1986, I.E., 32% OF THE TOTAL PATHOLOGY CURRICULAR HOURS (2). IT IS CONCEIVABLE THAT THE DECREASE IN THE REPORTED OR QUANTIFIABLE TIME IS COMPENSATED BY THE TIME SPENT IN SMALL GROUP DISCUSSIONS, OR INDEPENDENT LEARNING, ESPECIALLY WITH USE OF COMPUTER ASSISTED INSTRUCTION, AND/OR PROJECTION SLIDES.

THE FORM AND VENUE OF LABORATORY INSTRUCTION HAVE CHANGED IN SEVERAL SCHOOLS AS THE LABORATORY HAS BECOME INCORPORATED IN SMALL GROUP SESSIONS IN THESE SCHOOLS. THE LABORATORY MATERIALS, I.E., GROSS TISSUES AND MICROSCOPIC SLIDES ARE OFTEN USED TO ILLUSTRATE PATHOLOGY AS INTEGRAL COMPONENTS OF CASE STUDIES IN SMALL GROUP DISCUSSIONS. A VERY SMALL PERCENT OF SCHOOLS (2%) HAVE COMPLETELY ELIMINATED LABORATORY. STUDENTS IN THESE SCHOOLS EITHER USE COMPUTER PROGRAMS OR PROJECTION SLIDES TO REVIEW PICTURES OF GROSS AND MICROSCOPIC PATHOLOGY. SOME OF THIS OCCURS AS PART OF INDEPENDENT LEARNING.

COMPUTER ASSISTED EDUCATION IS UTILIZED BY OVER 40% SCHOOLS IN SOME FORM OR ANOTHER. MOST OF THESE ARE USED IN A SUPPLEMENTARY MANNER. ONLY A VERY SMALL PERCENT OF SCHOOLS USE THESE AS PRIMARY MODES OF ANALYSIS OF THE WRITTEN COMMENTS PERTAINING TO LABORATORY INSTRUCTION INDICATE THAT LABORATORY MATERIAL SHOULD BE USED TO ILLUSTRATE COMMON DISEASE MECHANISMS AND FOR CLINICO-

LEARNING. THE COMPUTER PROGRAMS USED INCLUDE LOCALLY DEVELOPED UNITS, PROGRAMS AVAILABLE FROM THE NATIONAL LIBRARY OF MEDICINE, OR SOME COMMERCIALY AVAILABLE PRODUCTS. ALTHOUGH COMPUTER PROGRAMS ENCOMPASS ALL TOPICS IN PATHOLOGY, THE ONES USED MOST OFTEN RELATE TO INFLAMMATION, NEOPLASIA, HEMOSTASIS, AND HEMATOPATHOLOGY.

THE USE OF GROSS SPECIMENS AND MICROSCOPIC GLASS SLIDES STILL OCCURS IN 85% OF RESPONDING SCHOOLS FOR INSTRUCTION OF ONE OR MORE TOPICS OF PATHOLOGY. CASE STUDY APPROACH AND CLINICOPATHOLOGIC CORRELATION ARE USED IN MORE THAN HALF OF THE RESPONDING SCHOOLS. THEREFORE, IT IS EVIDENT THAT WHILE NEWER TECHNOLOGIES E.G., COMPUTER ASSISTED INSTRUCTION HAVE BEEN INCORPORATED IN PATHOLOGY TEACHING, THE TRADITIONAL FORMATS, E.G., REVIEW OF GROSS SPECIMENS AND MICROSCOPIC GLASS SLIDES CONTINUE TO BE USED AT LEAST TO SOME EXTENT IN THE VAST MAJORITY OF SCHOOLS.

ALTHOUGH 54 RESPONDING SCHOOLS (60%) REPORTED IDENTIFIABLE HOURS FOR CLINICAL PATHOLOGY, ONLY 34 SCHOOLS (38%) REPORTED DESIGNATED HOURS OF REQUIRED INSTRUCTION IN CLINICAL PATHOLOGY LABORATORY. AMONG THE PROCEDURES STUDENTS ARE REQUIRED TO PERFORM, STUDY OF PERIPHERAL BLOOD SMEARS IS THE MOST COMMON, FOLLOWED BY URINALYSIS. MANY SCHOOLS INCORPORATE CLINICAL PATHOLOGY MATERIAL IN CASE STUDIES OR CLINICO-PATHOLOGIC CONFERENCES.

PATHOLOGIC CORRELATION, AND THAT PURE MORPHOLOGY FOR ITS OWN SAKE SHOULD NOT BE ILLUSTRATED. MORPHOLOGY OF RARE DISEASES OR RARE VARIANTS SHOULD NOT BE INCLUDED

IN PATHOLOGY INSTRUCTION OF MEDICAL STUDENTS.

IN CONCLUSION, THERE IS REMARKABLE VARIATION IN LABORATORY INSTRUCTION RANGING FROM MINIMAL TO A LARGE NUMBER OF HOURS. ALTHOUGH IT HAS UNDERGONE NUMEROUS CHANGES IN ITS FORM, VENUE, APPROACH AND EMPHASIS, LABORATORY

INSTRUCTION CONTINUES TO BE USED AS A SIGNIFICANT MODE OF INSTRUCTION IN THE VAST MAJORITY OF SCHOOLS. NEWER TECHNOLOGIES, E.G., COMPUTER ASSISTED INSTRUCTION HAVE BEEN INCORPORATED IN LABORATORY INSTRUCTION, BUT THE MAJORITY OF THESE ARE SUPPLEMENTARY MEANS ONLY. THE TRADITIONAL MEANS, (E.G., GROSS/MICROSCOPIC STUDY, CASE STUDIES, AND CLINICOPATHOLOGIC CONFERENCES) CONTINUE TO BE USED TO VARYING EXTENTS IN THE MAJORITY OF SCHOOLS.

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PLEASE SEE FIGURES 1 AND 2 ON FOLLOWING PAGE.

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FIGURE 1

MEAN NUMBER OF LABORATORY INSTRUCTION HOURS IN SCHOOLS WITH DIFFERENT TEACHING FORMATS OF PATHOLOGY INSTRUCTION

TRAD = TRADITIONAL

ENH TRAD = ENHANCED TRADITIONAL

HYBRID = COMBINATION OF TRADITIONAL AND PROBLEM-BASED/CASE-ORIENTED APPROACH

CASE/PBL PREDOM. = PREDOMINANTLY CASE-BASED/PROBLEM-BASED CURRICULUM AS DEFINED IN THE PAPER.

***INCLUDES 4 SCHOOLS THAT USE THIS FORMAT ONLY IN PART 2 OF PATHOLOGY (PART 1 BEING TRADITIONAL)**

FIGURE 2**MEAN NUMBER OF LABORATORY INSTRUCTION HOURS
FOR GENERAL PATHOLOGY, SYSTEMIC PATHOLOGY, AND CLINICAL PATHOLOGY**

TRAD = TRADITIONAL **ENH TRAD** = ENHANCED TRADITIONAL

HYBRID = COMBINATION OF TRADITIONAL AND PROBLEM-BASED/CASE-ORIENTED APPROACH

CASE/PBL PREDOM. = PREDOMINANTLY CASE-BASED/PROBLEM-BASED CURRICULUM AS DEFINED IN THE PAPER.

GP = GENERAL PATHOLOGY **SP** = SYSTEMIC PATHOLOGY **CP** = CLINICAL PATHOLOGY

* INCLUDES 4 SCHOOLS THAT USE THIS FORMAT ONLY IN PART 2 OF PATHOLOGY (PART 1 BEING TRADITIONAL)

CREATING EXAMINATIONS MULTIPLE CHOICE AND ALTERNATIVES

BRUCE A. FENDERSON, PH.D.; J. JON VELOSKI, M.S. AND IVAN DAMJANOV, M.D., PH.D.

STUDENTS RESPECT EXAMINATIONS THAT ARE COMPREHENSIVE, FOCUSED ON MAJOR TOPICS, AND CLINICALLY-RELEVANT. IN ORDER TO FULFILL THESE EXPECTATIONS, AND AT THE SAME TIME SECURE GOOD MONITORING OF THE EDUCATIONAL PROCESS, IT IS IMPORTANT TO WRITE TEST

ITEMS THAT MEASURE HIGHER-ORDER COGNITIVE FUNCTIONS, SUCH AS APPLICATION OF KNOWLEDGE, DATA ANALYSIS AND INFERENCE. ONE WAY TO ACCOMPLISH THIS GOAL IS TO WRITE TEST ITEMS THAT ARE CENTERED ON CLINICAL VIGNETTES.

INTRODUCTION

ONE OF THE MOST IMPORTANT "CONVERSATIONS" A TEACHER HAS WITH HIS/HER STUDENTS TAKES PLACE ON EXAMINATION DAY. EXAMINATIONS COMMUNICATE THE ESSENTIAL GOALS AND OBJECTIVES OF A COURSE AND REFLECT THE PHILOSOPHY OF THE TEACHING FACULTY. IMPROVEMENTS IN THE QUALITY OF EXAMINATIONS CAN IMPROVE STUDENTS PERCEPTION OF THE CURRICULUM AND LEAD TO ENHANCED LEARNING (1, 2).

THE PURPOSE OF THIS ARTICLE IS TO PROVIDE PRACTICAL ADVICE TO FACULTY INVOLVED IN THE PREPARATION OF STANDARDIZED TESTS FOR MEDICAL STUDENTS. WE WILL REVIEW WHAT IS MEANT BY A VALID EXAMINATION, PROVIDE TIPS ON WRITING HIGH-QUALITY MULTIPLE CHOICE ITEMS BASED ON CLINICAL VIGNETTES, AND MAKE A CASE FOR THE USE OF ALTERNATIVE TESTING FORMATS, SUCH AS EXTENDED MATCHING AND UNCUE. THIS INFORMATION IS PROVIDED IN THE FORM OF ANSWERS TO FREQUENTLY ASKED QUESTIONS.

WHAT CONSTITUTES A GOOD WRITTEN TEST?

A GOOD WRITTEN TEST MUST FULFILL SEVERAL CRITERIA. FIRST, IT MUST BE CAPABLE OF SHOWING THAT STUDENTS LEARNED APPROPRIATE CONTENT AND ACHIEVED THE ESSENTIAL GOALS OF THE COURSE. THIS IS REFERRED TO AS CONTENT VALIDITY. SECOND, IT MUST BE RELIABLE - MEANING THAT THE TEST SCORE IS PRECISE AND REPRODUCIBLE. PRECISION IS ESTIMATED USING THE KUDDER-RICHARDSON FORMULA 20 (COEFFICIENT ALPHA). AT THOMAS JEFFERSON UNIVERSITY, A TEST IS

GOOD WRITTEN TEST SHOULD BE RELATED TO AN IMPORTANT BENCHMARK, SUCH AS A FINAL COMPREHENSIVE EXAMINATION, THE UNITED STATES MEDICAL LICENSING EXAMINATION (USMLE), OR SOME MEASURE OF THE STUDENTS' FUTURE CLINICAL PERFORMANCE (FIGURE 1).

WHAT SHOULD BE TESTED?

A GOOD WRITTEN TEST SHOULD HIGHLIGHT IMPORTANT COURSE OBJECTIVES AND TEACHING MODALITIES, AND IT SHOULD BE COMPREHENSIVE. FOR EXAMPLE, IF A COURSE INVOLVES LECTURES, ASSIGNED READING AND CASE STUDIES, THEN STUDENTS SHOULD BE TESTED ON INFORMATION PRESENTED IN LECTURES, ASSIGNED READING AND CASE STUDIES. CLINICALLY-RELEVANT (IMPORTANT) TOPICS SHOULD BE EMPHASIZED. WHEREVER APPROPRIATE, ITEMS SHOULD BE FRAMED IN THE CONTEXT OF A CLINICAL

CONSIDERED TO BE RELIABLE IF IT HAS A COEFFICIENT ALPHA GREATER THAN 0.70. THIRD, IT MUST MAKE MEANINGFUL DISTINCTIONS AMONG STUDENTS AT DIFFERENT LEVELS OF ABILITY, LEADING TO ACCURATE PASS/FAIL DECISIONS (THERE MUST BE A MEANINGFUL VARIATION IN SCORES).

FOURTH, IT MUST BE PRACTICAL TO CONSTRUCT, ADMINISTER AND SCORE.

FIFTH, IT MUST BE CREDIBLE IN THE EYES OF STUDENTS, THE MEDICAL PROFESSION AND THE PUBLIC. THIS IS REFERRED TO AS FACE VALIDITY.

FINALLY, A

VIGNETTE TO STRENGTHEN CONTENT AND FACE VALIDITY (SEE BELOW).

WHICH TEST FORMATS SHOULD I CONSIDER?

POPULAR TEST FORMATS INCLUDE MULTIPLE CHOICE (BEST ANSWER, FIVE CHOICES), EXTENDED MATCHING (BEST ANSWER, 20 CHOICES), UNCUE (HUNDREDS TO THOUSANDS OF CHOICES), AND SHORT ANSWER ESSAY. MULTIPLE CHOICE TESTS ARE PREFERRED BY THE NATIONAL BOARD OF MEDICAL EXAMINERS (3) AND ARE USED EXTENSIVELY BY MOST MEDICAL SCHOOLS AROUND THE COUNTRY.

MULTIPLE CHOICE TESTS USE SHORT LISTS OF POSSIBLE ANSWERS THAT ARE PRESELECTED BY THE EXAMINER.

EXTENDED MATCHING AND UNCUE EXAMINATIONS USE A LARGER NUMBER OF POSSIBLE ANSWERS (OPTIONS), EACH OF WHICH MAY BE USED ONCE, MORE THAN ONCE, OR NOT AT ALL (4).

DOES THE CHOICE OF TESTING FORMAT MATTER?

EACH TESTING FORMAT HAS ITS OWN ADVANTAGES AND DISADVANTAGES. FOR EXAMPLE, SHORT ANSWER ESSAYS PERMIT THE TESTING HIGHER-ORDER COGNITIVE FUNCTIONS AND THEY ARE EXCELLENT FOR SMALL GROUP TEACHING. MULTIPLE CHOICE TESTS ARE PRACTICAL FOR INTERIM AND FINAL COMPREHENSIVE EXAMINATIONS. EXTENDED MATCHING TESTS ARE WELL-SUITED FOR WEEKLY QUIZZES. RECENTLY, WE PUBLISHED A COMPARATIVE STUDY ON THE RELIABILITY AND VALIDITY OF THE PRINCIPAL TESTING FORMATS USED IN MEDICAL EDUCATION (4). OUR RESULTS INDICATED THAT EXTENDED MATCHING AND UNCUED TESTS HAVE CONSIDERABLE ADVANTAGES OVER MULTIPLE CHOICE AND TRUE/FALSE EXAMINATIONS. THEY ARE MORE RELIABLE, BETTER ABLE TO DISCRIMINATE THE WELL-PREPARED FROM THE UNPREPARED STUDENT, AND WELL SUITED FOR TESTING CORE KNOWLEDGE BECAUSE THE EFFECTS OF PROVIDING CUES ARE MINIMIZED. NONETHELESS, MULTIPLE CHOICE EXAMINATIONS, PARTICULARLY THOSE BASED ON CLINICAL VIGNETTES, REMAIN A USEFUL TESTING FORMAT OF PROVEN EDUCATIONAL VALUE. USING A MIXTURE OF TEST FORMATS IS A REASONABLE OPTION.

HOW FREQUENTLY SHOULD TESTS BE ADMINISTERED?

IT HAS BEEN OUR EXPERIENCE THAT STUDENTS DO NOT OBJECT TO FREQUENT TESTING AND ACTUALLY LIKE THE FEEDBACK RECEIVED FROM REGULARLY SCHEDULED EXAMINATIONS. FOR EXAMPLE, IN THE PATHOLOGY

COURSE GIVEN TO SECOND-YEAR STUDENTS AT THOMAS JEFFERSON UNIVERSITY THERE ARE 22 WEEKLY QUIZZES,

FIVE INTERIM EXAMINATIONS, ONE FINAL PRACTICAL EXAMINATION, AND ONE FINAL COMPREHENSIVE EXAMINATION. THIS SCHEDULE HAS GIVEN US GOOD RESULTS SO FAR. WE BELIEVE THAT FREQUENT TESTING IMPROVES LEARNING AND SUBSEQUENT PERFORMANCE ON COMPREHENSIVE EXAMINATIONS, HOWEVER THERE IS ONLY SCATTERED EVIDENCE IN THE LITERATURE TO SUPPORT THIS HYPOTHESIS (5, 6).

How Many Items Should Be Included on Each Test?

FOR PRACTICAL REASONS, EACH TEST MUST PRESENT A LIMITED NUMBER OF QUESTIONS THAT MEASURE STUDENTS' KNOWLEDGE ON A RANDOM SAMPLE OF TOPICS. THE UNDERLYING PREMISE IS THAT THESE QUESTIONS WILL BE REPRESENTATIVE AND ADEQUATELY TEST THE OVERALL KNOWLEDGE EXPECTED OF A PROFICIENT STUDENT. ACCORDINGLY, A VALID TEST NEEDS TO CONTAIN ONLY ENOUGH QUESTIONS TO SAMPLE THE APPROPRIATE CONTENT AND GENERATE A COEFFICIENT ALPHA RELIABILITY ESTIMATE THAT IS GREATER THAN 0.70. THE RELATIONSHIP BETWEEN NUMBER OF TEST ITEMS AND TEST RELIABILITY IS SHOWN IN FIGURE 2. THESE EMPIRICAL DATA, OBTAINED AT THOMAS JEFFERSON UNIVERSITY, CLOSELY FOLLOW THE THEORETICAL FUNCTION DESCRIBED BY THE SPEARMAN-BROWN PROPHECY. COEFFICIENT ALPHA RELIABILITY ESTIMATES OF 0.70 CAN BE OBTAINED WITH EXAMINATIONS CONTAINING AS FEW AS 70 ITEMS, HOWEVER TEST RELIABILITY CAN BE

IMPROVED SIGNIFICANTLY BY USING EXAMINATIONS WITH 100 OR MORE ITEMS. THE NUMBER OF ITEMS USED ON AN EXAMINATION ALSO DEPENDS ON THE AMOUNT OF TIME AVAILABLE FOR TESTING. FOR EXAMPLE, IT HAS BEEN ESTABLISHED EMPIRICALLY THAT A TYPICAL STUDENT REQUIRES 40-70 SECONDS FOR EACH MULTIPLE CHOICE QUESTION. ACCORDINGLY, IT SHOULD BE POSSIBLE TO ASK THE STUDENTS UP TO 120 QUESTIONS IN TWO HOURS.

How Do I Construct High-Quality Multiple Choice Questions?

GUIDELINES (TIPS) FOR CONSTRUCTING WRITTEN TEST QUESTIONS FOR THE BASIC AND CLINICAL SCIENCES HAVE BEEN PUBLISHED BY DRs. SUSAN CASE AND DAVID SWANSON OF THE NATIONAL BOARD OF MEDICAL EXAMINERS (NBME), CO-AUTHORS OF THE USMLE STEP 1 AND STEP 2 (3). THIS VALUABLE INFORMATION IS ALSO AVAILABLE FROM THE NBME ONLINE AT: [HTTP://WWW.NBME.ORG](http://www.nbme.org). IN BRIEF, CASE AND SWANSON RECOMMEND THAT EACH TEST ITEM FOCUS ON A CLINICALLY-IMPORTANT CONCEPT AND ASSESS APPLICATION OF KNOWLEDGE (PROBLEM SOLVING), NOT RECALL OF AN ISOLATED FACT. CASE AND SWANSON RECOMMEND FURTHER THAT THE STEM POSE A CLEAR QUESTION: "IT SHOULD BE POSSIBLE TO ARRIVE AT AN ANSWER WITH THE OPTIONS COVERED." THESE GUIDELINES ARE SUMMARIZED IN TABLE I. ALTHOUGH INSPIRING, AND

MOST VALUABLE FOR COMPREHENSIVE EXAMINATIONS SUCH AS THE USMLE, THESE RECOMMENDATIONS ARE NOT ALWAYS APPLICABLE TO INTERIM EXAMINATIONS DESIGNED TO MEASURE THE ACQUISITION OF NEW KNOWLEDGE.

MOST FACULTY MEMBERS BELIEVE THAT LEARNING BASIC FACTS AND GENERATING CORE KNOWLEDGE ARE ESSENTIAL PREREQUISITES FOR

ADMINISTERED TO SECOND-YEAR STUDENTS AT THOMAS JEFFERSON UNIVERSITY SATISFY THE RECOMMENDATIONS OF CASE AND SWANSON LISTED ABOVE.

NONETHELESS, OUR STUDENTS MASTER THE REQUIRED MATERIAL AND EXPERTLY HANDLE THE HIGHER-TAXONOMY QUESTIONS POSED ON THE USMLE STEP 1.

How Do I Avoid Technical Flaws?

TECHNICAL FLAWS PROVIDE TESTWISE EXAMINEES WITH INAPPROPRIATE CUES AND ARE, THEREFORE, TO BE ASSIDUOUSLY AVOIDED. TECHNICAL FLAWS COMMONLY ASSOCIATED WITH MULTIPLE CHOICE QUESTIONS ARE LISTED IN TABLE II. MULTIPLE CHOICE QUESTIONS THAT READ: "WHICH ONE OF THE FOLLOWING IS CORRECT?" OR "ALL OF THE FOLLOWING ARE CORRECT EXCEPT?" ARE FLAWED ACCORDING TO CASE AND SWANSON, BECAUSE THEY LACK FOCUS, CONTAIN HETEROGENEOUS OPTIONS, AND DO NOT FOLLOW THE "COVER THE OPTIONS" RULE (IT SHOULD BE POSSIBLE TO ARRIVE AT THE CORRECT ANSWER WITH THE OPTIONS COVERED). THESE ITEMS OFTEN FORCE EXAMINEES TO GUESS WHAT THE WRITER INTENDED, BECAUSE THE OPTIONS ARE NOT COMPLETELY TRUE

CLINICAL PRACTICE AND, ACCORDINGLY, FEEL THAT TEST QUESTIONS MUST MONITOR STUDENTS' PROGRESS IN THIS REGARD. IN PRACTICE, THIS MEANS THAT MOST ITEMS ON INTERIM EXAMINATIONS WILL ASSESS FACTUAL KNOWLEDGE AND EMPHASIZE RECALL RATHER THAN REASONING. IN THIS CONNECTION, ONLY A SMALL PERCENTAGE OF ITEMS OR COMPLETELY FALSE. EXAMINEES ARE THEN FORCED TO JUDGE THE RELATIVE CORRECTNESS OF THE OPTIONS ON A CONTINUUM. EVEN THOUGH THESE STATEMENT-BASED QUESTIONS MAY BE FLAWED FROM THE PSYCHOMETRIC POINT OF VIEW EXPRESSED BY CASE AND SWANSON, WE BELIEVE THAT THEY CAN BE VALUABLE EDUCATIONAL INSTRUMENTS.

IT HAS BEEN OUR EXPERIENCE THAT THOUGHTFULLY-PREPARED ITEMS OF THIS TYPE ARE ABLE TO DISCRIMINATE WELL-PREPARED FROM MARGINAL STUDENTS, AS EVIDENCED BY

EXCELLENT ITEM DISCRIMINATION VALUES (>0.30). PERHAPS THE BEST ADVICE WE HAVE FOR AVOIDING TECHNICAL ERRORS IS TO LEAVE TIME FOR PROOF-READING AND EDITING.

WHAT ARE THE ADVANTAGES OF USING CLINICAL VIGNETTES?

CLINICAL VIGNETTES ENABLE THE ITEM WRITER TO CREATE EXAMINATIONS THAT RESEMBLE CLINICAL EVENTS TO BE ENCOUNTERED BY STUDENTS IN THE REAL WORLD. THEY FOCUS THE STUDENTS' ATTENTION ON IMPORTANT DISEASES AND ENCOURAGE THE DEVELOPMENT OF CLINICAL PROBLEM-SOLVING SKILLS. STUDENTS ANALYZE CLINICAL DATA, SEARCH FOR CRITICAL

CLUES, AND DRAW LOGICAL INFERENCES. THE FOLLOWING QUESTIONS ON THE TOPIC OF ACUTE MASTITIS

ILLUSTRATE THE DIFFERENCE IN CONTEXT BETWEEN ITEMS BASED ON SIMPLE STEMS AND THOSE BASED ON CLINICAL VIGNETTES:

SIMPLE STEM: A 24-YEAR OLD WOMAN WHO HAS BEEN BREAST-FEEDING EXPERIENCES PAIN, REDNESS AND SWELLING OF HER LEFT BREAST. WHAT IS THE MOST LIKELY DIAGNOSIS?

A TEMPLATE FOR CONSTRUCTING PATHOLOGY TEST ITEMS BASED ON CLINICAL VIGNETTES IS GIVEN IN TABLE III. THE STEM USUALLY PRESENTS THE PATIENTS' CHIEF PHYSICAL COMPLAINT, THE RESULTS OF THE PHYSICAL EXAM (INCLUDING LABORATORY DATA), AND THE PATHOLOGIC FINDINGS (IF NECESSARY). THE STEM THEN CONCLUDES WITH AN INCOMPLETE SENTENCE OR AN OPEN-ENDED QUESTION.

ARE EXTENDED MATCHING AND UNCUED EXAMINATIONS PRACTICAL ALTERNATIVES TO MULTIPLE CHOICE TESTING?

OUR RESULTS OBTAINED OVER THE PAST SIX YEARS AT THOMAS JEFFERSON UNIVERSITY

INDICATE THAT EXAMINATIONS BASED ON EXTENDED MATCHING AND UNCUED (FREE-RESPONSE OR FILL-IN-THE-BLANK) QUESTIONS ARE RELIABLE, VALID AND PRACTICAL (4, 7). AN EXAMPLE OF AN ITEM CONSTRUCTED IN THE EXTENDED MATCHING FORMAT IS SHOWN IN TABLE IV. IN THIS EXAMPLE,

VIGNETTE STEM: A 24-YEAR OLD WOMAN DELIVERED A 3.5 KG BABY AFTER AN UNEVENTFUL PREGNANCY. SHE BEGAN BREAST-FEEDING THE INFANT, BUT BECAME FEBRILE (38°C) ON THE 10TH DAY AFTER DELIVERY. SHE HAD NO ABNORMAL VAGINAL DISCHARGE AND NO PELVIC PAIN. SHE NOTICED REDNESS ON THE LOWER SIDE OF HER LEFT BREAST. SHE STOPPED NURSING THE INFANT, BUT THE SYMPTOMS PERSISTED AND THE ENTIRE BREAST BECAME SWOLLEN AND PAINFUL. WHAT IS THE MOST LIKELY DIAGNOSIS?

THE STUDENT READS THE STEM, REALIZES THAT SEVERE ATHEROSCLEROSIS DOES NOT OCCUR IN A 24-YEAR OLD MAN UNLESS THERE IS A MAJOR METABOLIC DISORDER, AND IS EXPECTED TO REASON THAT THE MOST LIKELY SINGLE GENE DISORDER IS FAMILIAL HYPERCHOLESTEROLEMIA. WE BELIEVE THAT EXTENDED MATCHING EXAMINATIONS ARE EXCELLENT FOR DISTINGUISHING WELL-PREPARED FROM UNPREPARED STUDENTS (HIGH ITEM DISCRIMINATION VALUES), USEFUL FOR TESTING CORE KNOWLEDGE BECAUSE THE

NEGATIVE EFFECTS OF CUEING ARE MINIMIZED, AND RELATIVELY EASY TO PREPARE BECAUSE THE LIST OF ANSWER CHOICES (OPTIONS) REMAINS CONSTANT WITHIN ITEM CLUSTERS. ADDITIONAL BENEFITS DERIVED FROM REGULARLY ADMINISTERED EXTENDED MATCHING EXAMINATIONS INCLUDE REDUCED PRETEST ANXIETY AND INCREASED STUDENT SATISFACTION WITH THE EVALUATION PROCESS. WE ARE PARTICULARLY KEEN ON THE USE OF EXTENDED MATCHING EXAMINATIONS FOR WEEKLY QUIZZES, BECAUSE THEY PROVIDE A SIMPLE AND EFFICIENT WAY OF MONITORING STUDENTS' ACQUISITION OF KNOWLEDGE AND ACTIVE PARTICIPATION IN THE COURSE (8, 9).

AN EXAMPLE OF AN UNCUEED ITEM IS SHOWN IN FIGURE 3. IN THIS EXAMPLE, THE STUDENT READS THE OPEN-ENDED QUESTION AND LOCATES THE BEST ANSWER IN A REFERENCE LIST. EACH WORD OR PHRASE IN THE REFERENCE LIST IS ASSOCIATED WITH A MULTI-DIGIT CODE NUMBER. THE STUDENT THEN RECORDS THIS CODE NUMBER ON THE ANSWER SHEET AND FILLS IN THE APPROPRIATE BUBBLES. SOFTWARE TO SCORE UNCUEED EXAMINATIONS IS AVAILABLE FROM DR. PAUL S. ANDERSON (10). THE ADVANTAGES OF USING EXAMINATIONS WITH MINIMAL CUEING HAVE BEEN DISCUSSED PREVIOUSLY (4, 7). UNCUEED EXAMINATIONS MAY BE IDEALLY SUITED FOR COMPUTER-BASED TESTING, A SYSTEM THAT IS CURRENTLY BEING DEVELOPED AT THOMAS JEFFERSON UNIVERSITY.

TABLE 1
GUIDELINES FOR CREATING MULTIPLE CHOICE QUESTIONS*

- ¥ EACH ITEM SHOULD FOCUS ON AN IMPORTANT CONCEPT (AVOID TRIVIA).
- ¥ EACH ITEM SHOULD ASSESS APPLICATION OF KNOWLEDGE, NOT RECALL OF AN ISOLATED FACT.
- ¥ THE STEM MUST POSE A CLEAR QUESTION AND IT SHOULD BE POSSIBLE TO ARRIVE AT AN ANSWER WITH THE OPTIONS COVERED.
- ¥ ALL DISTRACTORS SHOULD BE HOMOGENEOUS (DON'T TIP YOUR HAND).
- ¥ AVOID TECHNICAL FLAWS THAT BENEFIT TESTWISE EXAMINEES.

*FROM SUSAN CASE AND DAVID SWANSON OF THE
NATIONAL BOARD OF MEDICAL EXAMINERS, PHILADELPHIA

TABLE 2

TECHNICAL FLAWS IN MULTIPLE CHOICE QUESTIONS*

- ¥ THE STEM READS: "WHICH OF THE FOLLOWING IS CORRECT?" OR "ALL OF THE FOLLOWING STATEMENTS ARE CORRECT EXCEPT."
- ¥ THE STEM CONTAINS ABSOLUTE TERMS, SUCH AS "ALWAYS" OR "NEVER", OR VAGUE TERMS, SUCH AS "RARELY" OR "USUALLY".
- ¥ THE OPTIONS DON'T FOLLOW GRAMMATICALLY FROM THE STEM.
- ¥ THE CORRECT ANSWER IS LONGER OR MORE COMPLETE THAN THE OTHER OPTIONS.
- ¥ A WORD OR PHRASE IS REPEATED IN THE STEM AND THE CORRECT ANSWER.
- ¥ THE OPTIONS ARE LONG AND COMPLICATED.
- ¥ "NONE OF THE ABOVE" IS USED AS AN OPTION.
- ¥ NUMERICAL DATA ARE NOT STATED CONSISTENTLY.
- ¥ THE CORRECT ANSWER CAN BE DEDUCED BY FINDING LOGICAL CUES.

*FROM SUSAN CASE AND DAVID SWANSON OF THE
NATIONAL BOARD OF MEDICAL EXAMINERS, PHILADELPHIA

TABLE 3
TEMPLATE FOR WRITING QUESTIONS
BASED ON CLINICAL VIGNETTES

STEP 1. INSERT CLINICAL VIGNETTE

- ¥ PATIENT'S CHIEF COMPLAINT
- ¥ RESULTS OF PHYSICAL EXAM
- ¥ LABORATORY DATA
- ¥ PATHOLOGIC FINDINGS (WRITTEN OR VISUAL)

STEP 2. FINISH WITH A QUESTION OR INCOMPLETE SENTENCE

- ¥ THE MOST LIKELY DIAGNOSIS IS:
- ¥ THIS TUMOR IS HISTOLOGICALLY CLASSIFIED AS:
- ¥ AT AUTOPSY THE LIVER SHOWED:
- ¥ THE MAJOR URINARY FINDING IS:
- ¥ THE PRIMARY TARGET OF THIS AUTOIMMUNE REACTION IS:
- ¥ WHAT IS THE MOST LIKELY PRIMARY NEOPLASM?
- ¥ THE MOST USEFUL SEROLOGIC TEST TO DIAGNOSE THIS DISEASE IS:
- ¥ WHAT SERUM ENZYME IS ELEVATED IN THIS PATIENT?
- ¥ THE MOST LIKELY CAUSE OF DEATH WAS:

TABLE 4
EXAMPLE OF AN EXTENDED MATCHING ITEM*

THEME: GENETIC DISEASE

OPTIONS

- | | |
|----------------------------------|----------------------------|
| A. ACHONDROPLASIA | I. HUNTINGTON DISEASE |
| B. ALBINISM | J. MARFAN SYNDROME |
| C. CYSTIC FIBROSIS | K. NEUROFIBROMATOSIS |
| D. DUCHENNE MUSCULAR DYSTROPHY | L. NIEMANN-PICK DISEASE |
| E. EHLERS-DANLOS SYNDROME | M. OSTEOGENESIS IMPERFECTA |
| F. FAMILIAL HYPERCHOLESTEROLEMIA | N. PHENYLKETONURIA |
| G. GAUCHER DISEASE | O. POMPE DISEASE |
| H. HEMOPHILIA A | P. TAY-SACHS DISEASE |

LEAD-IN: FOR EACH PATIENT, SELECT THE MOST LIKELY SINGLE GENE DISORDER.

STEM: A 28-YEAR OLD MAN PRESENTS TO THE EMERGENCY ROOM WITH CHEST PAIN. THE PATIENT DIES TWO HOURS LATER. AUTOPSY FINDINGS INCLUDE SEVERE ATHEROSCLEROSIS, CORONARY ARTERY DISEASE, AND A MYOCARDIAL INFARCT.

* THIS ITEM IS CONSTRUCTED AFTER THE STYLE OF SUSAN CASE AND DAVID SWANSON. THE CORRECT ANSWER IS "FAMILIAL HYPERCHOLESTEROLEMIA".

PLEASE SEE FIGURES 1-3 AT END OF ARTICLE.

PERSPECTIVES

CREATING HIGH-QUALITY EXAMINATIONS FOR MEDICAL STUDENTS REQUIRES SKILL AND HARD WORK. THESE SKILLS CAN BE SELF-TAUGHT AND IMPROVE WITH PRACTICE. THEY CAN BE DEVELOPED FURTHER BY ATTENDING TEST WRITING WORKSHOPS (E.G., THOSE CONDUCTED BY THE NBME) AND BY LISTENING TO THE ADVICE OF PROFESSIONAL PSYCHOMETRICIANS. UNFORTUNATELY, WRITING HIGH-QUALITY EXAMINATIONS IS NOT A PROBLEM THAT CAN BE SOLVED ONCE AND THEN PLACED ON A SHELF.

EXAMINATIONS

MUST EVOLVE IN TANDEM WITH NEW KNOWLEDGE, FACULTY, TEXTBOOKS AND TEACHING METHODS. IN THE FUTURE, IT MAY BECOME NECESSARY TO FOLLOW THE LEAD OF THE NATIONAL BOARD OF MEDICAL EXAMINERS AND SWITCH FROM PAPER-AND-PENCIL EXAMINATIONS TO ONLINE TESTING. IN THIS CONNECTION, IT WOULD BE PRUDENT FOR MEDICAL EDUCATORS TO DEVELOP CLOSE WORKING RELATIONSHIPS WITH EXPERTS IN ACADEMIC COMPUTING AND INSTRUCTIONAL DESIGN.

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FIGURE 1

Figure 1. Relationship between students' mean scores on a pathology final comprehensive examination and students' performance on the United States Medical Licensing Examination Step 1 (June 1996). Least squares plot of the data (line) and correlation coefficient are shown. The results of a good written test will show a good correlation with student performance on a benchmark standard.

FIGURE 2

Figure 2. Relationship between the number of items on an examination and test reliability. These data were obtained empirically. They represent coefficient alpha reliability estimates for examinations of varying lengths that were administered to second-year medical students at Thomas Jefferson University during the past five years. Examinations with 70 or more items are precise and reproducible, with coefficient alpha scores greater than 0.70.

FIGURE 3

Figure 3. Example of an uncued test item, illustrating the procedure for recording answers on a bubble sheet for machine-scoring.

A WEB-PAGE TO TEACH PATHOLOGY to SECOND YEAR MEDICAL STUDENTS

-- SUCCESSES, FAILURES and LESSONS LEARNED

Robert N. McLay, Ph.D., Erich Meihoff, B.S. and Sanda Clejan, Ph.D.

Computer-based methods are an increasingly popular way to teach medical students. Prior to the 1998-1999 school year the Department of Pathology of Tulane University School of Medicine made a concerted effort to expand its web page and integrate use of the Internet into the curriculum for the sophomore pathology course. Students were able to use the web page for specifically-designed, computer-learning sessions and as a general aid for study. After the first exam, students were given a survey form in which they were asked provide information about themselves, their use of the web

page, and their opinions of the pathology course and its web page. Responses indicated that students did make use of the web page, showed considerable computer savvy, and had positive attitudes about web-based learning. A majority of students gave a positive or very positive rating to the pathology web page. Despite these positive factors, use of the page did not significantly correlate with test scores. In the surveys, students described several reasons why the web page had not been as helpful as had been hoped. Here we present those ideas and try to offer solutions.

Introduction

A simple search for "medical education" on the world wide web using the Yahoo search engine [1] done on the 26 of December 1998 revealed 1505 sites that offered information on the subject. A similar search for "pathology" turned up 309 sites. Whereas these numbers are still dwarfed by the 3816 books that a search of Amazon.com [2] gives on the subject of pathology, the

Quantifiable improvements in learning, such as increased board

speed and ease with which such books can be found on the web only serves to emphasize the increasing importance of computer-based resources in medical education. Several reports have detailed the development of sophisticated, computer-assisted tools for teaching medical students [3, 4]. In general, students have responded positively to the use of such resources [5].

scores, also have been reported after some medical schools have implemented web-based teaching

[4]. Outcomes on exams or other direct measures of learning have not always borne out the superiority of computer-based tools, however [7, 8].

The Department of Pathology at Tulane University School of Medicine has had a web site since 1996. In the summer of 1998 this web site was significantly expanded so that it could be used as a core source of information to medical students taking the sophomore pathology course. In the process of integrating web-based learning into the curricula we wished to evaluate what worked and what did not work about our web-page. We also wanted to know what the students thought could be done to make the web-page more useful.

To assess the effectiveness of presenting the material on the web, a survey was passed out to all students after the first exam. This survey asked about use of the web-page, opinions of the material presented, general computer-use, and study habits. Results were gathered to describe aspects of the web the students most liked and used. To determine whether the web could improve learning or decrease the necessary amount of time spent studying, we investigated correlations between use of the web page, time spent studying, and exam results.

Materials and Methods

The web page [9], designed for use with the Sophomore Pathology Course at Tulane University School of Medicine, was rebuilt and expanded during the summer prior to the beginning of the 1998-1999 school year. Medical students and faculty experienced with web design built the page from material provided by fifteen members of the faculty in the Department of Pathology [10]. Material presented on the web included: the class schedule, objectives for each block of the course, slides that had been used in lectures, compressive reviews on particular topics, old exams, case presentations, graphics of pathology specimens, review questions, and links to other pathology sites.

Faculty members strongly encouraged the use of the web page by the students. Eight time blocks of 2-3 hours each were allotted in the schedule for computer-learning sessions during the year. No attendance was taken at these sections, but students were told that some of the material for which they would be held responsible (mostly the case presentations) would be available only on the web page. Students could access the web page via computers provided on campus, or by modem connections to the Internet from home. Most of the material, other than the case presentations, was also available to the students in other formats, such

as paper handouts, glass slides, or film slides.

Twenty three days into the course the students took their first exam. Topics covered included acute and chronic inflammation, cellular death and repair, immunopathology, dermatopathology, and introduction to laboratory medicine. All these topics had been covered in lectures, textbooks, and handouts and on the web page. At the end of the exam, students were given a survey asking about their use of these various resources and their opinions concerning these resources.

The survey consisted of 53 questions. These questions asked information about:

- computer and study habits,
- overall impressions of the pathology course and the web page,
- how often respondents used the web page and its various parts,
- perceptions of how useful respondents felt the page and its various parts to be,
- preferences for allocating teaching resources to the web page or to other areas,
- ideas for improving the web page,
- and reasons why they might not have used the web page.

Most of the questions required the students to give a particular rating by bubbling in answers (e.g., very useful, useful, slightly useful, not useful at all, or no opinion) on a Scantron form, but room was also allotted to write in individual responses.

Surveys were turned in on a volunteer basis. Students were asked to provide identification numbers so that results on

exams could be compared to survey results.

No names were recorded, and individual grades and responses were kept private.

Data were collected and correlated with exam results. Students involved in the production of the web page or who worked on the survey were excluded from the study.

Descriptive statistics were collected and examined by the authors. The effects of web use on exam grades, and on the amount of time spent studying were examined by testing correlations with SPSS for Mackintosh release 6.1.1. software.

Effect of web page use on exam grade was computed by partial correlation, correcting for study time and grades in previous classes. Effect of web page use on study time was computed by partial correlation correcting for grade on the exam and grade in previous classes. Bivariate (Pearson's) correlations among pairs of variables also were computed for the purpose of estimating in which direction bias was introduced

Results

During the time between the beginning of the school year and the first exam in the pathology course the web page averaged over 750 hits a day. We can not say exactly what fraction of these hits came from the students taking the course, but survey results indicate that the students did make extensive use of the web page. All the students who turned in surveys reported accessing

the web page at least once. Only 9% gave up after this first attempt, 67% used the web-page to access specifically suggested material, and 34% reported using the page for suggested material and as an additional study aid, using it as frequently as they would textbooks or lectures.

Of those students eligible to participate in the study, 53 turned in surveys (35% of those eligible). Of these, 10 declined to include an identification number, leaving 43 students for whom correlations between grades and

survey responses could be made. The average exam grade for those students who turned in surveys was not significantly different from the class mean.

Respondents indicated a high level of computer savvy. All respondents indicating that they accessed the Internet at least once since the beginning of the school year, and 47% said that they used the Internet more than once a week. Computers on campus were made use of by 94% of students and 75% owned their own computer at home.

Table 1
Aspects of the Web Page Students Used and Found Useful

Rank	Most Useful	Most Used
1	Old Exams	Graphics of Pathology Specimens
2	Case Presentations	Case Presentations
3	Graphics of Pathology Specimens	Lecturers' Slides
4	Lecturers' Slides	Old Exams
5	Listed Objectives for Each Part of the Course	Review Questions (not in exam format)
6	Comprehensive Subject Reviews	Comprehensive Subject Reviews
7	Schedule	Listed Objectives for Each Part of the Course
8	Review Questions (not in exam format)	Class Schedule
9	Links to Other Web Sites	Links to Other Web Sites

Table 1 lists the results from questions in which students were asked to rate nine aspects of the Tulane Pathology Web Page in terms of usefulness and frequency of use. Students gave responses of very useful/often used, to not useful/did not use for each aspect listed. Scores were assigned to each response, with 1 indicating the highest response, and 5 the lowest. Results were averaged and are ranked in order of student responses.

By a small margin, students gave the web page a favorable rating. Fifty one percent of students said their overall impression of the pathology page was positive or very positive, vs. 43% as negative or very negative, and 6% having no opinion. Although this response was not as enthusiastic as had been hoped, it was much better than overall impressions of the pathology course at the time: (15% positive or very positive, 79% negative or very negative, 6% no opinion.) The most popular part of the page, in terms of what students rated as useful, was the old exams. By contrast, the graphics of pathology specimens was the most popular aspect of the web

page as measured by how often the web page was used. Students reported that having links to other web sites was both the least used and the least useful aspect of the pathology web page. (Table 1) The mean exam scores for students reporting the most extensive use of the web site (often) was numerically higher than those who used the page occasionally (only when specifically requested to do so), or those who used the page only once and then gave up (figure-1). However, bias was introduced by other variables. There was a significant ($p < 0.05$) positive relationship between amount of time that students spent on the web and overall time spent studying.

Table 2
Reasons Students Did Not Use the Web Page

Rank	Reason
1	The web page was too slow to load
2	Was not sure how to extract the appropriate information from the web page (did not know how to use it.)
3	Did not have easy access to the web
4	Looked briefly the web material, and not find it useful
5	Did not have time
6	The quality of the page was too poor
7	Did not know of the existence of the web page

Table 2 lists reasons, in order of importance, why students said they did not make more extensive use of the web page. Students were given these seven reasons on survey and asked to rate them in terms of how important (from very important reason, to not an important reason at all) such reasons were in impeding use of the web page. Scores from 1 to 5 were assigned to each response, respectively. Results were averaged for each aspect, and are shown in order of those responses. Additional reasons students gave for not making use of the web page, which were not listed on the survey, but written in individual comments, are given in the results section.

(Students who used the web more were also studying more.) Also, there was a significant positive relationship ($p < 0.001$) between grades in previous courses and grades on the pathology exam. (Better

students in general did better on the exam.) Correcting for these biases, the relationship between time spent using the web page and grades on the exam was not significant. There was also no significant

decrease in study time with web use for students with similar grades in the past and on the exam.

When examining the reasons students might have not benefited from the web page as much as had been hoped, individual written responses added to data that was taken from Scantron responses.

For example, when students were asked if they would prefer that the web page present higher quality graphics and features that might be slower to load, or if instead they would prefer lower quality graphics and features that loaded more quickly, responses were split (Figure-2).

However, whereas no specific written complaints were received about blurry graphics or crude interfaces, several students wrote to complain about interminable waits, complicated plug-ins, and newer features of html that made parts of the page inaccessible to them. This complaint was particularly common concerning aspects of the page that demanded large amounts of memory, and thus overwhelmed the capabilities of older computers, including many of those on campus. One student complained that he "could not access half the stuff due to Despite these critical comments, we also received quite a bit of positive feedback about the web page. Given a choice between placing more material on the web or directing resources to other areas, 51% of the students chose the web vs. 43% in favor of investing in other areas and 6% with no opinion. "Overall I think it {the web page} is a good concept, a great way to learn, but the way it is presented is important," said one student. As another put it, ". While {sic} the web page is

computer malfunction {low memory}...I am very frustrated and angry about this." As other students put it, "do not use fancy programs...all we need is important {and} efficient information." "Stop using plug-ins and programs that everyone doesn't have"

In the survey, students were asked to give reasons why they did not make more extensive use of the web page. A list of reasons we had guessed might impede their use of the page was offered for their opinions (Table-2). Speed once again ranked high on the list of complaints. Also mentioned frequently in the comments, but not specifically listed in our survey, were criticisms about lack of integration between the web page and the course. "{The web page} should be completely complementary to what we do in class...It should not be just another mode to dump random information on us." "Images should be explained and collected coherently... not scattered from different lectures, or lectures that we never had." "If you are going to have the web as a resource, don't put up bits and pieces. Make it an all encompassing resource. Other-wise it is hit and miss and you waste time searching for something that isn't there."

indeed impressive, it is by no means a substitute for teaching...TEACH US."

Discussion

The initial attempt to expand Tulane's Pathology Web page into a vital part of the sophomore curriculum provided notes of both caution and hope. We were disappointed to find no significant effect of time spent using the web page on exam grades or on reducing the amount time necessary to learn the material. Lyon et al.

[8] previously reported that even if grades were not improved, learning with computers might make studying more efficient. In this investigation, we did not find that to be the case. The average grades for the group that made the most use of the computer were higher than those who avoided the computers, but if anything we found that this was a reflection of the fact that working hard in general and working hard at the computer just seem to go hand in hand.

It should be noted that, in contrast to the report by Lyon et al., in our study students were free to use or not to use the computers. We did not pre-select students for different groups because we felt that it would have been inappropriate to restrict or require additional resources for some students and not others. Since all the students

unpopular sections of a web site could require more hits to successfully gather the necessary information.

who answered surveys had chosen to make some use of the web page, we were unable to evaluate whether infrequent use of the web was valuable.

We only found that extensive use of the web page seemed to provide no more positive effect on grades than minimal use.

That surveys were turned in on a volunteer basis likely caused some self-selection bias. Students who intend to use the computers were probably more interested in the survey, since the goal of the project was to improve computer services. Results also may have been biased toward negative opinions. We suspect that disgruntled students were more likely to speak up than those who felt the situation adequate. Such negativity may be seen in the rather poor showing that the class as a whole received in the surveys.

Despite the negative feelings reported toward the class as a whole, a majority of students did report favorably on the web page. There were clearly things they liked.

Three things are worth noting in particular about their preferences. First, that what they ranked as most useful was not necessarily the same as what was used the most. This may cast some dispersion on the use of hit counters as the only measure of whether or not a web page is successful.

It is possible that the best aspects of a web page are simple enough so that their message

can be taken away with little time spent, whereas poorly designed and

Second, it is worth noting what came at the bottom of the list of both use and usefulness. That was links to other pages.

Links are the defining aspect of the World Wide Web, and to find that students did not

make use of them is somewhat disappointing. Cimino and Socratous [11] previously reported similar findings with a web page designed to teach surgical residents. That links were not particularly popular in either study does not necessarily mean that we should give up on giving students access to other resources. It may, however, reinforce the student's comment about focus, that the web should "not be just another mode to dump random information." If students wish to find extra material not related to that being taught at the moment, there are plenty of available search engines. In the future we will try to restrict links to those sources directly relevant to the course.

Third, it is worth simply noting that students were positive about the future of the web page. Considering the technical difficulties some students reported, this is most heartening. They had criticisms, but did not want to give up on the idea.

Turning now to those criticisms, many of which can be taken as constructive comments on what to do and not to do in building a web page to teach medicine.

The majority of those criticisms can be summed up in two

for the exam.

words --accessibility and applicability.

We faced accessibility problems in that the Tulane Pathology Web Page used design that was often too complicated for old machines. There are two solutions to such a problem: get better computers and net access, or make the web-design simpler. Better computers and faster internet service are, in the long run, the preferable solution. Some material can not be adequately run without plug-ins. Complicated multimedia or three-dimensional graphics were not an essential part of our web site, however. In our case, plug-ins were often used as an expedient. Several packages made it easy to put documents up on the web in particular formats. Any advantage from initial time-savings was lost, however, since students could not access the files.

Applicability was the other big problem we faced. Many students felt that the web paged did not fit with the rest of the course.

Our web page was written by a large number of people. Formats, level of detail, and methods of presentation varied significantly. Most of the page had been organized by organ systems. At the time, the course was covering topics and concepts that covered many systems, but did not require the students to know any one system in to level of detail covered by the entirety of the web page. Students were sometimes, quite justifiably, lost. The web page provided a general resource, but students did not know to what extent they could rely on the page to provide the information they needed

Based on the input we received from students we are in the process of revamping the page to better suit their

needs. New material is being placed up on the web in the same order as which it is presented in the lectures. To ensure that students receive a coherent message about what they should be learning from the web page, we are trying to bring more of the faculty who provide the lectures and test questions directly into the process of web design. We also are trying to make sure that all students can access the material quickly. Plug-ins are discouraged.

Material is put up on the in simple html, using JPGS and GIFS. File size is being reduced, and smaller, lower quality images are being added so that, if they wish, students can have the choice to get the material more quickly.

Many of our revisions may sound like an attempt to over simplify, or even dumb-down, the web page. This is not the case. Simple and accessible use

by the students is a priority, but we are not removing material. We want the web page to serve as a comprehensive resource beyond just the needs of the class. We also want high quality images and applications to be available to those who can use them. We are, however, making sure that the presentation is more uniform, that small files are available in addition to larger images, and that the web page calls attention to the most important material.

The internet, like previous technologies before it, can and will be a powerful tool. As we discovered, however, it is not a panacea. Difficulties inherent in the transition to computer-based learning will likely be with us for some time yet to come.

Teaching via a web page requires ironing out technical bugs, posting useful material, and like

all other formats it still requires good teachers to put things together in a way students can use. Despite problems, our students responded positively to the potential of the computer-based learning. With their comments and criticisms, we hope to fulfill that potential.

FIGURE 1

This graph shows the average (mean) scores on the pathology exam, with students divided according to their self-reported use of the Tulane Pathology Web Page. Four choices were given on the survey for the question how often did you access the pathology web page: "never, once, occasionally {i.e., only when specifically requested to do so}, or often {i.e., used the page as you might a book or lectures}.

FIGURE 2

This graph shows how students responded to the following question "In designing web pages, designers are often faced with the problem of making the web page higher quality (more graphics, higher resolution, more features, etc.), or more efficient (fewer features, and lower resolutions, but faster to load). Specifically for the Tulane Pathology Page would you have preferred that the page be higher quality or higher efficiency?" As illustrated, responses were divided. Individually written comments, described in the Results section, were more informative.

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TEACHING LABORATORY MEDICINE IN A CLERKSHIP MODULE

John D. Kemp, M.D.

It is a commonly held view that medical students are not taught enough about the medically appropriate and cost-effective use of laboratory tests. It is the purpose of this article to describe a new two-week clerkship in Laboratory Medicine which is now a mandatory component of the subspecialty clerkship rotation sequence for all third and fourth year

medical students at the University of Iowa. This clerkship was introduced as a part of an overall restructuring of the medical curriculum. The case-based approach to learning has been used to address issues surrounding the use of laboratory tests in common primary care situations. Student and facilitator reaction to this new clerkship has clearly been positive.

Introduction

It is generally acknowledged that physicians order too many laboratory tests. It is also generally believed that such behavior must be reduced, one way or another, as the pressure for cost containment continues to mount. In order for physicians to make informed decisions about the medically appropriate, cost-effective use of laboratory tests they need to know more about the fundamental principles of Laboratory Medicine. They clearly could, and almost certainly should, learn about these principles in medical school. However this topic has received little attention in most curricula. In an effort to address this deficiency in medical education, the University of Iowa College of Medicine created a new two-week clerkship module in Laboratory Medicine during the process of redesigning the medical curriculum. This clerkship is mandatory for all third and fourth medical students. The purpose of this paper is to describe the structure of, and the

reaction to, this innovation in medical education.

Goals:

The Curriculum and The Clerkship

As the University of Iowa College of Medicine began the process of redesigning the medical curriculum, the following objectives were put forth.

- To promote integration of material and active learning by student.
- To promote self-directed learning throughout the curriculum.
- To provide earlier clinical exposure for students.
- To strengthen student performance.
- To provide centralized oversight of the curriculum.

- To provide new material and decrease unwarranted duplication.
- To encourage innovative teaching methods.
- Use clinical situations/vignettes commonly encountered in the primary care setting.
- Promote the use of evidence-based medicine.

The new Laboratory Medicine clerkship addresses several of these objectives. First (and foremost) it introduces new material aimed at the knowledge deficit in the medically appropriate and cost-effective use of laboratory tests. Beyond this, however, and due to the fact that the clerkship employs case-based learning, it also promotes integration of material and active, self-directed learning. The clerkship also encourages innovative teaching methods.

The opportunity provided in the new curriculum was for a two-week clerkship in which both Laboratory Medicine and EKG training would run concurrently. Clearly there was not a lot of time available and the goals for the clerkship had to be chosen carefully. The faculty ultimately settled on the following.

- Use case-base and problem-base learning to teach the fundamental concepts of Laboratory Medicine.
- Emphasize concepts underlying test performance analysis.

- Encourage independent learning and the use of computer-based resources.

Course Structure

The Laboratory Medicine and EKG clerkship is one of a group of required subspecialty clerkships (the others are Anesthesia, Dermatology, Neurology, Ophthalmology, Orthopedics, Otolaryngology, Psychiatry, Radiology, and Urology). Since half of the clerkships are taken in the third year and half in the fourth year, the student groups are composed of nearly equal numbers of third and fourth year students. The standard group size is eight students. While it is not difficult to work with smaller groups, larger groups are resisted.

The two-week module is normally constructed as six encounters (Monday, Wednesday, and Friday) from 1:00 to 3:00 p.m. It is typically suggested that the students align themselves into four-person teams and that each team tackle one case per week (i.e., one case in three sessions). Each student is expected to focus on one, rarely two, learning issues and to produce a brief (1-2 pages) handout with references for the second and third sessions. These

handouts form the basis for peer to peer learning. It is clear that this time sequence represents a fairly dramatic compression of the learning which is normally encountered in case-based learning. It has been

found that this sometimes necessitates modest intervention on the part of the facilitator to help the students sharpen the focus toward specific questions about laboratory testing. While this has not been a problem, it may reduce the range or pattern of learning link-ages that are set up.

Course Content

Cases Put Into Use at Iowa	
· Cardiac Markers	· Hemochromatosis
· HIV Testing	· Iron Deficiency Anemia
· Hepatitis C	· Lead Screening
· Helicobacter Pylori	· Meningitis/Drug Resistance
· PSA Testing	· Bacteruria
· Diabetes	· Pharyngitis
· Thyroid Testing	· Monoclonal Proteins
· PAP Smears	· Medicolegal Death/Dementia
· Lipids	· Bronchitis
· Pre-Op Testing	· Fecal Occult Blood

These cases clearly cover a range of problems that are commonly encountered in primary care. They include two cases (PAP smears and Medicolegal Death/Dementia) which, while not routinely considered to fall within the realm of laboratory medicine cases, nevertheless provide important, practical learning opportunities.

A following list of characteristics which defines a case that is most likely to be a successful stimulus to learning has been developed by the faculty.

- Commonly encountered in primary care.
- Changing technology.
- Opportunities for test performance comparisons.
- Borderline values construction.
- Areas of controversy/conflicting guidelines.

The students clearly appreciate primary care relevance, are surprised at the rate of change of testing technology, and enjoy the challenge of comparing tests and devising their own algorithms for use. The repeatedly encounter situation in which they have to use criteria to make a defensible diagnosis. Their capacity for critical analysis is tested when their research turns up conflicting practice guidelines.

Course Facilitators

The Laboratory Medicine clerkship runs almost continuously during the calendar year and therefore requires a significant number of facilitators. The following list indicates the backgrounds of the individuals now involved with the clerkship.

- M.D. or M.D./Ph.D. with training and professional responsibility in Clinical Pathology.
- Ph.D. with ongoing professional responsibilities in Clinical Pathology.

- Senior level residents and fellows with Clinical Pathology training and a prior successful educational track record.
- M.D. with training in Anatomic Pathology with a particular interest in prostate cancer and cytology.

It is not really surprising (but is fortunate nonetheless) that the faculty members who have contributed the most as facilitators in the Laboratory Medicine clerkship have been those who were either not involved, or were less involved, in the General and Systemic Pathology Course. The new course therefore did not tend to further burden the busiest teachers. In fact, since the new curriculum actually has fewer contact hours for the General and Systemic Pathology course, the overall effect has been to produce a more even distribution of the medical student teaching load in Pathology, with contact hours shifting from AP faculty to CP faculty. It is also very important to note that individuals with very diverse interests have been able to succeed as facilitators. Indeed, it is a fact that

senior level residents have gotten some of the best evaluations. The facilitators believe that this is attributable in part to the basic structure and logic of the small group, case-based learning process.

Facilitators are evaluated by means of a form which is standard for other case-based learning exercises at the University of Iowa College of Medicine.

This form, which allows for a scalar ranking on fourteen behaviors and for responses to three questions, may be more complex than is needed in the long run. The questions, however, do yield helpful comments and the responses on prior forms are reviewed with each instructor before they start new groups.

Grades: Process and Concerns

The grading choices for the Laboratory Medicine clerkship are Honors, Near Honors, Pass, and Fail. The grades are derived from evaluation of in-class performance (50%) and of performance on essay test questions (50%). As is the case for facilitator evaluation, a standard form is being used for evaluating class performance. The form has fifteen scoring parameters and, while useful, may also be more complex than is necessary and may profit from simplification in the future.

The central problem that has arisen in grading in the Laboratory Medicine clerkship turns out to be on which commonly occurs in small group learning. While these questions do not yield quantitative scalar data, the responses have been very informative. The first two years of evaluations have been compiled and reviewed by the Course Director, the Chair of the Pathology Department, and Director of

formats. It arises from the fact that students clearly tend to enjoy the process and work fairly hard. The facilitators recognize that effort and have an unambiguous tendency to award high percentage of Honors and Near Honors grades. Not surprisingly, the Dean's Office wishes to restrain this tendency.

The faculty is now in the process of working to resolve this conflict.

Course Evaluation

At the beginning of the course, a five question evaluation form was devised.

1. What did you think of the cases you studied? Were they generally useful or should certain cases be deleted? Why? What kinds of cases should be added?
2. Was the amount of material appropriate for the time available? More cases or fewer? More time per case or less?
3. What did you think of the group interactions? Did all of the participants treat each other with respect? Did everyone get a fair chance to participate? Did you like working as teams?
4. What could your facilitator have done differently to improve the learning experience?
5. Please note any other suggestions or items of concern. Your assistance is very much appreciated!

the Office of Consultation and Research in Medical Education. The unanimous verdict has been that the course is a success. The positive responses have strongly outweighed the negative from the start. A composite of positive responses is represented below.

- Cases are: solid, basic, useful, quite useful, relevant, appropriate, pertinent, important, very good, excellent.
- Group interactions are: enjoyable, good, very good, perfect.
- Facilitators are: good, helpful, great, excellent.
- Other comments: gained appreciation of controversy, like computer use, course right on target, wouldn't change a thing, most fun with CBL yet.

Before moving to a discussion of the negative comments which have been encountered, it is important to remember that, as new curriculum has been implemented, the profile of students entering the Laboratory Medicine clerkship progressed from

- 1) third year students only with no prior CBL experience (1996-97 school year) to
- 2) a mixture of third year students with prior CBL and fourth year students without prior CBL experience (1997-98 school year), and finally to
- 3) the current stable configuration of a mixture of third and fourth year students who have all had prior CBL experience (1998-99 and subsequent school years).
- 5) further clarify the objectives and expectations of the course.

A composite of the negative comments received during the 1997-98 year (the second year of the clerkship) is as follows.

- More cases, less time for case.
- More laboratory focus - less clinical.

With this information in mind, a composite of representative negative comments received during the 1996-97 year (the first year of the clerkship) is listed below.

- Too many learning issues, time commitment too high.
- More guidance on where to look for articles.
- More individual feedback.
- Clarify objectives, expectations.
- Occasional views: dubious about curriculum change, not a good method of teaching, inefficient.

Although the faculty has come to believe that these comments were related in a very significant way to the students' lack of prior experience with CBL, the response was to

- 1) tell students to prioritize and pick one, or at most two, learning issues.
 - 2) provide them with some direct demonstrations of computer literature searching.
 - 3) provide them with more feedback.
 - 4) intervene as necessary to push for focus on laboratory issues, and
- Broader exposure to laboratory medicine needed.
 - Two weeks not enough - more time required.
 - Occasional comments: prefer lectures, material too easy, heard it before, CBL is useless.

The faculty is currently experimenting with ways to respond to the first two comments by accelerating the case/problem presentations. Consideration is also being given to making other types of laboratory medicine information and experience available to students on an optional basis since the time allotted is likely to remain limited. During the 1998-99 school year, all of the students have come to the clerkship with prior CBL experience. The students now know how to define, research, and present learning issues much more effectively and appear to want to make the most of the opportunity to learn about Laboratory Medicine. Their evaluations continue to be positive.

Summary

What has been briefly described appears to be a novel experiment in medical education.

At the moment, it is not apparent that any other medical school has a similar mandatory subspecialty clerkship rotation in Laboratory Medicine for all third and fourth year students. The belief at the outset was that to know more about the medically appropriate and cost effective utilization of laboratory tests. The constant pressure to restrain the cost of medical care is likely to continue to justify this view.

The course structure which has been employed exhibits features which may increase the likelihood of success if other medical schools attempt to develop and implement similar courses. The CBL format appears to be both educationally effective and administratively practical. In regard to the former point, studies by the Associate Dean for Student Affairs and Curriculum at the University of Iowa College of Medicine indicate that there is a positive correlation between higher scores for a given topic on the USMLE examination and prior CBL

experience relating to that topic. In regard to administrative practicality, the CBL format presented the most feasible means by which it became possible to rapidly muster the resources required

by the instructor to initiate and maintain the course.

In addition to the high priority concerns about relevance, educational and effectiveness, and administrative practicality, it should not be forgotten that the students and the facilitators enjoy the course. The current plan at Iowa is to continue working to improve this new clerkship.

Acknowledgments

The Laboratory Medicine clerkship could not have come into existence without the advocacy of Drs. Fred Dick and John Olson. The steady support of Dr. Richard Lynch, the Department Chair, has also been critical. The unstinting efforts of Ms. Robin Turner in the Pathology Learning Center have been critical to the success of the course, as have the efforts and input of numerous faculty and housestaff who have generated case material and acted as facilitators. I thank them all. I also thank Ruth Kjaer for her assistance in the preparation of this paper.

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SUMMARY OF WORKSHOPS
APC/PRODS/GRIPE Pathology Education Conference
Boulder, Colorado
July 22-25, 1998

The following papers represent the summaries of the 15 workshops held at the APC/PRODS /GRIPE Education Conference in Boulder, Colorado. The workshops were well-attended and covered a variety of topics of importance to pathology educators. While the issues that were raised frequently were difficult to resolve, the participants were able to develop plans of organization and to achieve valuable solutions by the end of the sessions. The summaries are worth the time necessary for review. Some in particular are important as a guide for dealing with the uncertainties of the effects of health care reform (Workshop 13: Teaching More with Less). Others cover the practical issues we contend with in the changing educational environment: what to teach, how to teach to different health professionals, how to incorporate computer-assisted education into the curriculum, how to make the material clinically relevant, what is the value of the post-sophomore fellowship, and modalities of assessment. And several reports discuss philosophical issues of medical education: who sets the curriculum, student vs. faculty-directed learning, creating habits of life-long learning, missions of the department and the school, and faculty incentives and rewards. All in all, the leaders and the participants put in a lot of work that resulted in a great deal of valuable information. We commend and thank them for their efforts.

Workshop Titles	Co-Leaders
1. <i>Student-Directed Learning - They Know Best</i>	Mary Lipscomb, Robert Colvin, Patsy Lill
2. <i>Faculty-Directed Learning - We Know Best</i>	Bruce Alexander, James Dixon, Peter Ward
3. <i>Who Owns the Curriculum? - They Do!</i>	Thomas Drake, David Bailey, Suzanne Stensaas
4. <i>Who Owns the Curriculum? - We Do!</i>	Doyle Graham, Michael Borowitz, Michael Lyons
5. <i>How to Make Learning Habit-Forming: The Elements of Lifelong Learning in Pathology</i>	Agnes Kane, Bertha Garcia, Fred Gorstein
6. <i>Pathology Education for All Health Professionals: Do We Lump or Split?</i>	Arthur Schneider, Ivan Damjanov, Robert Reddick
7. <i>The Teaching of Laboratory Medicine in a Brave New World</i>	James Newland, James Fine
8. <i>It=s Not Just AIn One End and Out the Other@: Modalities of Assessment in Pathology</i>	Lazaro Gerschenson, Robert Boorstein
9. <i>Teaching - Incentives and Rewards. What=s in It for Me?</i>	William Hickey, Robert Hunter, Joseph Price
10. <i>How can Pathology Drive the Bandwagon? The Trend Toward Increased Clinical Relevance in the Basic Sciences</i>	John Holliman, George Michalopoulos, Gregory Naus
11. <i>To Heck with the Dean, It=s My Program:</i>	John Wright, Philip Conran

*Balancing the Mission of the School and
the Mission of the Department*

13. *Teaching More with Less: Cost Versus
Resources. How to Make the Most of
Limited Options in Pathology* Richard Lynch, Roger Geiss, Patrick Ward
14. *How Rotten is the Core? Pathology Knowledge
Base: What Do I Teach in My Course* Mary Ann Sens, Barbara Bosch
15. *Is the Post-Sophomore Fellowship an
Anachronism?* Daniel Sedmak, Robert Lee, Michael Prystowsky
17. *Use of Computers in Pathology Education* Sherman Bloom, Robin Jones

SUMMARY OF WORKSHOPS

ACP/PRODS/GRIPE Pathology Education Conference

Workshop #1: Student Directed Learning: They Know Best!

Co-Leaders: Robert Colvin, Patsy Lill, and Mary F. Lipscomb

The Members of the Workshop (our “tutorial” group):

Robert Colvin, Patsy Lill, Mary Lipscomb, Hal Dvorak, Joe Fantone, Bruce Fenderson, John Hardman , Charles Hitchcock, Vital Montpetit, Adrienne Rogers, Tom Tillack, Phillip Ursell, David Wilkinson

Definitions:

Student Directed Learning (SDL) can be both problem-based (PBL) and non-PBL. PBL can be either patient-centered or non patient-centered. Although PBL can be independent student directed (ISD), most considered that PBL for the most part occurs in the tutorial setting where students learn in teams, and it is usually done using the patient-based approach.

Elements of PBL

1. Method is central (tutorial method).
2. Students must decide learning issues and how to get there.
3. Team approach important.
4. Objective definition is the faculty responsibility; they should be implicit in the written case, but may require help of the tutor facilitator to reach.
5. But predominantly student driven.

Positives

1. Active, not passive learning
2. Problem solving skills are honed
3. Integration of basic/clinical science
4. Communication and social skills learned; team play encouraged
5. Reduces information overload
6. Increases student and faculty satisfaction
7. Increases relevance of information learned
8. Increases enthusiasm for life-long learning
9. Increases skills (including computer skills) at acquiring new knowledge and setting priorities about what to learn

10. Learn to disagree in a positive way
11. LCME likes it
12. Promotes creativity
13. Allows presentation of pathology in the best way (easy to show a bridge between basic and clinical sciences)

Negatives / Risks / Challenges

1. Faculty time = cost
2. Lack of faculty skill as case writers and tutors
3. Lack of faculty interest, understanding, and/or desire to use PBL
4. Computer support is required, but is often lacking and expensive, i.e. hardware, software, expertise to facilitate
5. Some student learning abilities may not fit. (This could indicate misfit of student for the practice of medicine)
6. May not prepare students for standardized testing, i.e., National Boards
7. Students may not choose to use time wisely. (Implicit in this type of curriculum is that time must be given for independent study.)
8. Faculty may not respect students= right to independent study time
9. If curriculum integrated, discomfort with necessary central governance, i.e., A loss of control@ issues

Note: Although PBL is most often a dominant mode for learning in integrated curricula, it can also be incorporated in non-integrated curricula.
10. Quality control, e.g., lack of uniformity of tutors
11. Difficulty of assuring there is uniformity of learning, i.e., “spotty” learning, gaps in important information
12. Evaluation of outcomes and measurement of whether cost effective is difficult.
13. May lose opportunities to teach morphology optimally since the perception is gross and microscopic anatomic requires sequenced learning.

Some Solutions

1. Utilize Ph.D. students, residents, volunteer faculty , other faculty
2. Use a hybrid system: lecture and lab admixed with PBL
3. Use (after making) national data bank of cases

SUMMARY OF WORKSHOPS

4. Tutor and case writing training should be offered
5. Use knowledgeable medical students to teach computers B set up computer labs
6. Spottiness
 - a)keep grids of learning issues
 - b)post learning issues on computer for students sharing / faculty evaluation
7. Evaluations
 - a)Exit interviews
 - b)Pgy 1 interviews / surveys of program directors
 - c)National Boards (at least stay even)
 - d)need a method of measuring success as a physician

Teaching Morphology in PBC

1. Interpose traditional formal labs (easy in a hybrid curriculum)
2. Provide images on computer programs
3. Integrate into cases, e.g., provide images on computer or bring scopes into the tutorial rooms

Confounding Variables for Individual Institutions

1. Available support may be slim
2. Student / faculty ratio untenable
3. Large student bodies may make extensive use of tutorials cost prohibitive

WORKSHOP #2: Faculty-driven Learning: We Know Best

Co-Leaders: Bruce Alexander, Jim Dixon, Peter Ward

The expectation of this workshop was to define the issues and elements which support the concepts and use of faculty-driven traditional lecture and laboratory based learning. The issues for discussion were:

- Historical Perspective
- Content
- Assessment
- Resources
- Faculty Skills
- Management/governance

The different teaching formats that were discussed were:

- Traditional (lecture, lab)
- Traditional, enhanced by other means
- Hybrid of traditional, case-oriented/problem-based
- Primary case-oriented/problem-based

We discussed positive and negative aspects of these format options:

LECTURE

Positives

- Consistency
- Efficiency (teaching)
- Economy scale
- Knowledgeable source
- Prioritizing information for students
- Augmentation of information for students
- Current information for students
- Modeling/mentoring for students

Negatives

- Expert may be a bad lecturer
- Rigid time line
- Passive learning
- Lack of interaction with faculty
- Inefficient (learning)

LABORATORY/CASE STUDIES

Positives

- Less intimidating
- Variable formats
- Case-driven
- More active
- Interactive
- On-the-spot feedback
- Reinforcement

Negatives

- Less consistent
- Less efficient
- Less economical
- Subject to distractions

Some confounding factors are:

- Faculty - size, ability, incentives, other forces
- Mission of school - primary care vs clinical scientists
- Teaching format - departmental vs multidisciplinary
- Departmental autonomy
- Dedicated educational budget

As an exercise in the workshop, we employed a "grading scheme" (Values-Driven Strategic Planning, Adapted by PathQuest, Inc., Bernhoff Dahl, MD; e-mail: Pathquest@aol.com) used for predicting outcomes of complex tasks or strategic plans. The table lists proactive factors on the horizontal axis: Strategic Planning, Skills, Incentives, Resources, and Action; with outcomes on the vertical axis: Confusion through Anxiety, Apathy, and Frustration, to Business as Usual, and, ultimately, Change. We used this exercise in our workshop review to assess the potential risks of change. The exercise was very interactive and, we feel, a positive experience for the participants. Dr. Dixon presented the above in Summary form on Saturday morning.

APC/PRODS/GRIPE BOULDER-98

FACULTY-DRIVEN LEARNING: WE KNOW BEST

Leaders - Bruce Alexander, Jim Dixon, Peter Ward

Define the ISSUES and ELEMENTS which support the concepts and use of faculty-driven traditional lecture and laboratory based learning.

INTRODUCTIONS B

School/Role/Type of Curriculum

Teaching Format:

Traditional (lecture, lab)

Traditional, enhanced by other means

Hybrid of traditional, case-oriented/problem-based

Primary case-oriented/problem-based

HISTORICAL PERSPECTIVE(S)

DEFINITION OF ISSUES

DEFINITION OF ELEMENTS

ASSESSMENT/WRAP-UP PRIOR TO SATURDAY PANEL DISCUSSION

Workshop #4: Who owns the Curriculum? -- We do!

Co-Leaders: Doyle Graham, Michael Borowitz, Michael Lyons

Our basic assumption was that the role of Pathology is to teach the manifestations and mechanisms of disease, not just to teach morphology while the clinicians teach pathophysiology. We saw this as especially important in organ-based, integrated teaching.

What works best? We felt that ownership by Pathology was critical, but that this could occur whether the course was independent or integrated. Pathology has the advantage of bridging the basic and clinical sciences, but must work for a "seat at the table" on all major curriculum decisions that involve teaching about disease; this requires pathologists to be flexible.

Positive Aspects:

Accountability

Takes advantage of the connection pathologists have with clinicians.

Pathologists know the content better.

Pathology is a bridging discipline.

The role of the pathologist in patient care can be made apparent.

Students can acquire a coherent body of facts about disease, along with training in skills fundamental to clinical medicine.

Opportunities Created:

With clinicians busy making money, Pathologists have the opportunity to play a more central role in integrating basic science with clinical medicine.

The identity of the pathologist is not lost; Pathology can be seen by the students as something besides an "Ancillary Service."

The Pathologist can frame the context of clinical discussions and help other basic scientists provide clinical contexts for teaching their discipline.

Pathologists can teach pathophysiology.

Negative Aspects:

Because of the unique responsibilities given to pathology, students suffer if the Department of Pathology does not have gifted or committed teachers who can make the material exciting.

If Pathologists don't/can't provide clinical contexts, it is difficult to Justify maintaining pathology control and the course will be absorbed.

If the faculty of the Department of Pathology is not up to date in basic sciences, the basic science cannot be integrated effectively, and again pathology control is difficult to justify.

Unless the faculty/students from outside the Department are consulted, there may be inadequate review/modification of course content and major issues omitted.

This is especially true of important diseases in which there is little in the way of Morphologic alterations, such as cardiac arrhythmias

Risks:

Pathologists can be isolated.

If we do not deliver (e.g., provide clinical context), we can disappear.

Confounds:

SUMMARY OF WORKSHOPS

ACP/PRODS/GRIPE Pathology

Education Conference

Having an independent course in Pathology provides an opportunity to profess the discipline. This is a clear disincentive to merge into an integrated course. Thus, if pathology finds itself in an environment where curriculum integration is being done, it must not resist just for the sake of resisting, but clearly articulate the role pathology needs to play in the overall picture.

Where student contact time for teaching is proportional to departmental funding from the dean, it may be difficult to decrease hours even when this is the most appropriate curricular decision.

The size of the Department is another confound, as there may be missing expertise or commitment to teaching.

The status and commitment of the dean.

Clinicians may be out of date and may need in-service training to participate effectively in joint teaching

Workshop #5: How to Make Learning Habit-forming: The Elements of Lifelong Learning in Pathology

Co-Leaders: Agnes Kane, Bertha Garcia, Fred Gorstein

Workshop #5 discussed four issues:

What is self-directed learning? Lifelong learning was re-defined as self-directed learning by the members of this workshop. This implies that the students develop the knowledge base, organizing framework, and motivation to develop their abilities as self-directed learners, not only during medical school, but also throughout their careers. A major goal is to empower the student: establish the expectations for self-directed learning, develop a sense of individual responsibility in each student, and create a supportive, cooperative education environment. Strong motivating factors for self-directed learning are: need for re-certification, rapid advances in medicine, and professional responsibility to teach patients. Faculty and administrative responsibilities required to facilitate self-directed learning include: clear expectations, defined goals and learning objectives, provide language and organizing framework in pathology, provide adequate time and tools for self-directed learning, and serve as role models. Testing format should be based on the skills acquired during self-directed learning such as cases, problem-solving, take-home or open-book exams, and essays. A controversial issue is elimination of detailed handouts.

What are the characteristics of a lifelong learner?

- curiosity
- willingness to pursue uncertainty
- willingness to learn from peers
- ability to work in a group, with faculty facilitation
- framework for self-assessment
- critical questioning and reflection
- ability to seek information from a variety of sources

Assessment of self-directed learning:

- on-going feedback from students
- peer evaluation of faculty
- pass-fail grading
- testing should evaluate skills acquired through self-directed learning, not isolated facts
- role of self-assessment is controversial, but essential for lifelong learning to continue

How do you motivate and teach faculty to engage students in self-directed learning?**Potential risk or barriers:**

- content overload
- time constraints
- time required for reflection and integration
- time required for faculty preparation
- faculty resistance to change
- student resistance, although most undergraduates are already motivated towards self-directed learning, this motivation seems to be lost in medical school
- variability in student preparation or cognitive skills
- mismatch between student and teacher

Potential solutions:

- teach faculty communication, learning, and facilitation skills
- allow faculty time to practice and develop these skills
- feedback from peers and chair
- provide incentives, promotions for teaching innovations
- willingness to teach outside of expertise
- provide adequate institutional support
- foster lifelong commitment to teaching among the faculty

Workshop #6: Pathology Education for All Health Professionals: Do We Lump or Split?

Co-Leaders: Arthur S. Schneider, MD, Ivan Damjanov, MD, PhD, and Robert Lee Reddick, MD

Led by Arthur S. Schneider, M.D. (Chicago Medical School), Ivan Damjanov, M.D., Ph.D. (University of Kansas), and Robert Lee Reddick M.D. (University of Texas Health Sciences Center, San Antonio, workshop participants raised several issues related to the topic, Pathology Education For All Health Professionals: Do We Lump Or Split?". Group participants each described the role of their own departments in such teaching, and it quickly became clear that the nature of teaching activities was highly variable among the institutions represented by group members. The group then addressed the spectrum of health professionals for whom pathology education might be required. In addition to health workers traditionally associated with pathology, such as medical technologists and technicians, cytotechnologists, histotechnologists, and perhaps pathology assistants, the group listed other professions such as dentistry, nursing, physical therapists, nutritionists, specialists in medical informatics, and graduate students in basic science programs. The general experience was that dental pathology education programs were conducted separately from medical student programs, but that these programs were often a responsibility of the medical school department. In contrast, graduate students were generally taught along with the medical student group. For medical technologists, the consensus was clear that the needs were quite different from those of medical students and that combined programs were not appropriate, i.e. we should split rather than lump. There was some discussion concerning methods of teaching, and several modalities were discussed. These included lectures, combined lectures and laboratory sessions, demonstrations, case studies, and autopsy presentations by live pathologists, closed circuit TV, or videotapes. Whatever the modality, the consensus was that case-oriented methodology was highly effective. However, the lecture format continues to persist because of the efficiency (to the teacher) of this approach. The group also discussed the benefits and disadvantages to pathology of providing such instruction. Increased visibility, justification of FTEs, and enhanced recruitment opportunities were mentioned on the positive side. On the downside, lack of resources or dilution of resources was a concern. Also discussed was the nature of teaching material, particularly textbooks. There was a consensus that ideally such materials should be prepared by academic pathologists, even if pathologists do not actually teach the courses. It was also pointed out that such materials may prove to have a wider audience than the allied health group field. For example, a text designed for allied health workers authored by one of the group leaders has also proved effective as a text for medical student remedial or makeup courses.

Problems/Issues

- What is the spectrum of teaching programs for non-physician health professionals presently conducted by academic departments of pathology
- To what group of health professionals are such programs addressed

- Should these programs be "lumped" with teaching programs for medical students, or should they be "split"
- What are the modalities of teaching that should be used
- What are the advantages and disadvantages to pathology departments which provide such instruction
- In addition to direct instruction, what additional activities should be contributed by academic pathologists

Solutions/Conclusions

- Teaching programs for non-medical health professionals conducted by academic pathology departments are evidently extremely variable as evidenced by polling the small sample (approximately 23 departments represented by the discussion group)
- In addition to health workers traditionally associated with pathology, such as medical technologists and technicians, cytotechnologists, histotechnologists, and perhaps pathology assistants, other groups such as dentistry, nursing, physical therapists, nutritionists, specialists in medical informatics, and graduate students in basic science programs should be addressed
- The general experience of the discussion group was that dental pathology education programs were conducted separately from medical student programs, but that these programs were often a responsibility of the medical school department. In contrast, graduate students were generally taught along with the medical student group. For medical technologists, the consensus was clear that the needs were quite different from those of medical students and that combined programs were not appropriate, i.e. we should "split" rather than lump
- Several modalities of teaching were discussed. These included lectures, combined lectures and laboratory sessions, demonstrations, case studies, and autopsy presentations by "live" pathologists, closed circuit TV, or videotapes. Whatever the modality, the consensus was that case-oriented methodology was highly effective. However, the lecture format continues to persist because of the efficiency (to the teacher) of this approach
- The discussion group discussed the benefits and disadvantages to pathology of providing such instruction. Increased visibility, justification of FTEs, and enhanced recruitment opportunities were mentioned on the positive side. On the downside, lack of resources or dilution of resources was a concern.
- There was a consensus that ideally, teaching materials, particularly textbooks, should be prepared by academic pathologists, even if pathologists do not actually teach the courses

Workshop #7: The Teaching of Laboratory Medicine in a Brave New World

Co-Leaders: James R. Newland, and James S. Fine

Approaches to Teaching Laboratory Medicine

Clinical Pathology learning experiences for medical students vary significantly: Lecture-based approaches include a separate course, incorporation into a basic pathology course as appropriate to the subject material, part of an integrated curriculum; small group exercises including case-based studies incorporated into organ system courses; computer-aided instruction; laboratories as a part of a course; and selective laboratory rotations. Web-surfing as an elective in clinical pathology was used as a voluntary, non-credit effort at one institution. Clinical as a senior elective lecture/discussion has been quite successful at a few programs. Evaluation in most instances is through the use of multiple choice questions.

The group discussed the best ways to teach Clinical Pathology. Basic Clinical Pathology is best integrated into the instruction on basic disease principles. It was felt that further instruction in the third and fourth years should be context-based: "Learn it when you need it." Case-based small group discussion could be used at this time in addition to real patients. In a lecture-based course, it was stressed that blocks of instruction should be taught by one instructor for better continuity.

Amount of Clinical Pathology

The group was in general agreement that there is a certain core of Clinical Pathology which students should learn during the first two years: The most common laboratory tests. Above all, the students should be able to interpret laboratory tests. Test selection, test appropriateness, and algorithm development are best learned in the junior and senior years. Cost-effectiveness should be saved for the senior year or later. Technique should mainly be the concern of the laboratorians, not the medical student. Technique in a few selected tests would be appropriate.

Location of Clinical Pathology in the Curriculum

The group felt that the learning of Clinical Pathology should occur across all four years of the medical curriculum. As noted above, in the first two years basics and pathogenesis should be covered. One idea was that Clinical Pathology instruction could be specific to appropriate rotations (e.g. coagulation and blood bank during surgery rotations) during the junior and senior years. At the senior level, there could be a comprehensive review to include: ordering practices, interpretation, test selections, sensitivity, specificity, false positives and negatives, drug interference, and specimen handling.

Effect of Managed Care on the Curriculum

Presently, there has been little effect of managed care on Clinical Pathology instruction content. This is in large part due to the fact that appropriate test selection has always been a part of Clinical Pathology instruction, but is now mandated by managed care. Managed care has discouraged pre-op testing, panels, screens, and automatic reordering, but will encourage education in outcomes, medical necessity, wellness testing, and critical pathways.

Workshop #8: It's Not Just "In One End and out the Other": Modalities of Assessment in Pathology

Co-Leaders: Lazaro Gerschenson, Robert Boorstein

The discussion consisted of technical issues (When do you discard a question? Do you use a "set question bank?" etc.) or ideological issues ("What do you want to test for? Are we educating general practitioners or specialists?").

There was agreement on that Pathology education is essential in SOM curricula and that it should be balanced between providing information/language vs. be balanced between providing information/language vs. the mechanistic basis of disease. Overall the small group teaching is favored and the ratio between lectures and labs is about 50/50. Most courses use assessment modalities involving a majority of multiple choice with a minority using kodachromes, case studies and essays.

There was a remarkable uniformity in our analysis of the issues.

Workshop #9: Teaching: Incentives and Rewards. "What's in it for Me?"

Co-Leaders: William Hickey, M.D., Joseph A. Price, Ph.D.

There were two different groups of participants, one discussion group each day, conferring on the topic. The following were the key questions used to provide a direction for the talks. However the discussions were driven by the participant's analysis and comments, and were not strictly limited to this list. Each session ended with feeling of better insight into the challenges facing other departments, and a few new ideas for future reflection.

Questions for consideration and discussion:

- (1) Is there a problem? Does your faculty view teaching as a stimulating and desirable activity, or as a burden?
- (2) Is teaching required for faculty membership in your department? Exceptions?
- (3) What are the REAL objectives of your department? Where does teaching rank?
- (4) Is teaching rewarded? How --- materially (\$\$ or other), prestige, 'intangibles", promotion? What seems to work? What doesn't?
- (5) What are your hurdles in getting folks to teach? How did you get over them? Where and how did you fail?
- (6) Are there standards for teaching in your department? Who sets them? How are they monitored and evaluated? Is there peer review of quality, content, delivery, style?
- (7) Do you rely on a core of good teachers while most faculty don't teach?
- (8) Does your department get funds from the dean to compensate for teaching time? If so, how are they allocated?
- (9) What do you tell new recruits about your expectations for their teaching time?

Summary

The discussions focused on teaching medical students, reserving issues of training Residents. Overall, because the individual situations in which departments operate vary tremendously, the particulars of the discussion questions varied, with each participant somewhere unique on the spectrum of the issue at hand. However, several consistent themes emerged, which can be related, although the many interesting details of input from participants would be voluminous.

The sessions began with the discovery that faculty are consistently interested in teaching and wish to do a good job, although, with expected variance. This seems to be, in part due to the fact that there are alternate career opportunities, and the people who choose academic positions are favorably disposed toward teaching, even if it is generally a required activity. The amount of teaching varies from the clear majority of the person's time, to less than ten lectures per year. Some are required to do some teaching in order to have an appointment at the hospital, others were hired to teach as a major effort. Some departments have the needed resources, others have a very small cadre of full time members, and the bulk of the teaching is done by unpaid volunteers.

Usually, the department has no particular incentives to offer to encourage better teaching, nor do organizations as a whole give it particular consideration. Other issues of productivity and accomplishment compose the key elements for promotion and tenure. The workshop participants would like to see this changed to allow for some overt recognition of jobs well done in the area of teaching as well. On their own initiative, and without particular institutional support, several chairmen have created modest overtures in this direction. As one participant offered, "a coffee mug and a certificate can go a long way". There was some general agreement

that while teaching is an important component of departmental responsibilities, it only gets significant attention if a problem erupts, and not the appropriate rewards when all is done well.

In part, because faculty are self motivated and usually successful, the question of standards for teaching was not a major issue. Student evaluations were used to varying extents, with the understanding that they can be good indicators of major problems, but also can be naive and inaccurate. Several schools required success on national boards to progress through the curriculum, which serves as a rough external monitor of success. As with other personnel issues, it is important to be clear at the beginning to new faculty what their range of responsibilities are, how they will be rewarded and compensated, and the presumed high standard required for teaching efforts.

The final conclusion was that the teaching incentives question is not generally a major problem; but chairmen would like to have more options in this area.

Workshop #10: How can Pathology Drive the Bandwagon? The Trend Toward Increased Clinical Relevance in the Basic Sciences

Co-Leaders: John Holliman, George Michalopoulos, Gregory Naus

With the trend toward a more integrated and relevant (i.e. clinically based) curriculum, how does pathology position itself to play a significant role in designing such a curriculum?

Pathology needs to remind administrators and clinical colleagues of its long-standing experience and expertise in education.

Pathology needs to maintain and enhance its professional identity among colleagues and students.

Individual pathologists should maintain an extended presence with students throughout a course or term (clinicians come for only a short time to cover their area of expertise, but a pathologist's experience covers a broad range of topics. Students should recognize the breadth of knowledge pathologists hold).

Rotate students through surgical path, clinical labs, etc. to give them a flavor of what day-to-day life of a pathologist is and our central role in the health care team.

Utilize residents to go one-on-one with students to give an idea of pathology's role.

With managed care, clinicians are more likely to be burdened with rigid patient care schedules and have less time for education - pathologists have somewhat more flexibility in rearranging schedules and therefore could be more aggressive and available for curriculum design and administration.

In instances when pathology has been left out of the loop in the design of integrated curricula, students have asked to be exposed to more pathology than clinicians are able to deliver.

Potential outcome measures of the effectiveness of pathology teaching in the basic science years:

Do students in clinical years and beyond appreciate the role of pathology in health care?

Do students seek out pathology electives in clinical years in preparation for careers outside of pathology?

How many students seek careers in pathology?

Workshop 11: To Heck with the Dean, It=s My Program: Balancing the Mission of the School and the Mission of the Department

Co-Leaders: Philip Conran and John Wright

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Recent LCME directives to two institutions, recommending more centralized control of the curriculum, were reviewed and each participant was asked to relate curriculum development and implementation at their own institution. It became apparent that the LCME has become more proactive (?intrusive) in the area of curriculum development and implementation, particularly over the past several years. On the basis of such recommendations, "centralized control" has been implemented differently at each of the schools B in some, significant faculty input has been essentially eliminated or is at best inconsequential. The following summarizes the basic conclusions reached by the two separate workshop groups.

Workshop conclusions:

The LCME currently exerts a strong influence on curriculum content, context and execution. Is this appropriate and just who drives the LCME?

The LCME currently advocates much more centralized control over curriculum development, including what and how material is taught. Is this consistent with the tradition of faculty involvement in curriculum?

Schools are interpreting and implementing the LCME "message" in differing ways. In some schools the dean=s office is being directive but acting in a facilitative fashion. In other schools the process has been characterized as a "complete takeover" by what might be characterized as "decanal zealots".

Although central administrative direction of the curriculum is probably essential, the process should ensure adequate faculty input and involvement.

RWJ (and the like) have undoubtedly influenced the curriculum both at the school level, through funding of programs, and through its influence within the LCME and other accrediting bodies. Should such organizations be able to exert so much power and influence and what are their qualifications to do so?

There is a pressing need to define, document and measure what is viewed as “success” insofar as curriculum reform is concerned. Many expressed the view that curriculum design makes little difference in the final product. What evidence is there that current/future recommendations for curriculum reform are based on solid outcomes data?

Are there limits to what can be demanded by the LCME? For example, can the LCME demand that specific courses be offered B ex. Pathophysiology? Can the LCME demand implementation of PBL? Can the LCME define the number of students in “small groups”? The current “ideal” appears to be six B many schools, with finite faculty resources, have as many as 25 students in each group B again this begs the question as to the outcome data upon which current recommendations/edicts are based.

What role should the APC play in monitoring, advocating, and contributing to the process of curriculum change/reform currently underway. This process no doubt affects much broader aspects of the educational template than just pathology.

Workshop #13: Teaching More with Less: Cost Versus Resources. How to Make the Most with Limited Options in Pathology Education.

Co-Leaders: Richard Lynch, Roger Geiss, Patrick Ward

The word "LESS" in the title refers to resources that are diminished as consequences of two types of forces that are impacting on the teaching of pathology: 1) educational forces, and 2) economic forces.

Educational forces that are limiting the time available for the teaching of pathology include a more centralized control of curriculum with an emphasis on primary care, social, economic and ethical aspects of medicine. This has the consequence of decreasing the amount of time available in the curriculum for the teaching of pathology. Other educational forces that can impact on pathology teaching include: 1) class size; 2) teaching formats; 3) facilities; 4) the prior academic preparation of medical students; 5) and student lifestyle changes that have the effect of competing for the time they dedicate to study. The growth in case-based learning formats is increasing the amount of faculty effort required to staff the small group format.

Economic forces that are limiting the teaching of pathology include: 1) the erosion of clinical income as managed care impacts on academic medical centers is resulting in the loss of the education subsidy that previously came from practice revenues; 2) the pressure to generate clinical income is decreasing the time available for faculty to administer pathology courses and to serve as facilitators in small group teaching activities; 3) as clinical income decreases, the Dean is collecting less tax dollars and this is decreasing the subsidy of education that comes from the Dean, and; 4) as the numbers of pathology residents and fellows decreases, this historically important departmental teaching resource also decreases.

Discussion of these forces and their consequences was followed by consideration of some possible solutions, and these included: 1) to modify current operational processes in order to optimize the use of faculty time; 2) to consider the selective use of retired faculty and adjunct faculty in pathology teaching; 3) to utilize collaborative and consortia approaches with other Departments of Pathology to develop electronic media-based teaching and testing materials, and to attain the highest quality materials while avoiding unnecessary duplication of efforts; 4) to develop new revenue streams for our departments by marketing our educational and academic expertise instead of giving it away free to publishing companies; 5) to distinguish the teaching of students done as a faculty member of a College of Medicine from the teaching of residents done as a member of a hospital staff. If a faculty member were to commit only 5% of their effort to teaching students, this amounts to approximately 100 hours per year. Considering how small 5% is, the question was raised as to how many faculty actually put as much as 100 hours per year into the teaching of students. As pathology educators are we putting adequate numbers of hours into medical student teaching?

It was clear from the discussion that different departments have different types of problems regarding the teaching of pathology. Some discussants reported that inadequate or no reward is given in their departments for their efforts in teaching students. Other discussants reported that their main problem was inadequate allotment of time in the centrally-controlled curriculum for the teaching of pathology. Some departments reported that their pathology teaching program is strong, stable and achieving the desired goals. It was obvious from the discussion that many of these differences reflect the differences amongst departments in their size, environment, geography and other vital statistics.

**Workshop #14: How Rotten Is the Core? Pathology Knowledge Base:
What Do I Teach in My Course?**

Co-Leaders: Mary Ann Sens, MD, PhD and Barbara D. Bosch, MD

The participants in our workshop sessions discussed both issues of curricular content, as well as modalities of instruction, that were deemed to be important in undergraduate pathology education.

Autopsy and Forensic Pathology

Our workshop groups felt that these aspects of pathology should be covered in some form within the pathology course. Participation in an autopsy was thought to be the most valuable, particularly when combined with observing the microscopic component and writing up an autopsy report. There was variability among programs as to the best timing of this experience during medical school. Instructional alternatives to this approach included demonstration of autopsy material within laboratories, as well as discussion of autopsy findings within clinicopathologic conferences or problem-based learning units.

In addition, fundamental principles of forensic pathology were identified as an essential curricular component. Examples of these topics consisted of the importance of the death certificate, determination of cause of death, toxicology, and issues of violence and abuse.

Clinical Pathology

Clinical pathology instruction was thought to be best taught in an integrated manner within organ system pathology or in the later years of medical school (e.g., first day of the M3 internal medicine clerkship, M4 elective, pathology interest group meetings). Curricula with Aback-to-basic-science@ time allotments within the last two years of medical school could well cover clinical pathology in that forum. Aspects of clinical pathology that were considered significant were test interpretations, limitations and costs. A suggested practical method to teach several basic principles of clinical pathology was to perform a routine chemistry screen on each student in concert with their phlebotomy experience.

Pathology Laboratories

There was a strong consensus that the exercise of systematic observation and problem-solving using gross tissue and glass slides was more educationally valuable than learning morphology with Kodachrome slides. This technique, illustrating the A"art of pathology", was likened to the skills necessary for the completion of a patient history and physical exam. Workshop members found that a case-based format was useful within labs, and that there was a role for student preparation and presentation. Interaction between faculty and students, and among students, was felt to be extremely beneficial. An additional idea was to "labify" lectures or, in other words, to include a number of case presentations along with the pathologic material.

Practice of Pathology

Workshop participants agreed that the optimal pathology curriculum should contain some exposure to the "real-life" practice of pathology, such as pathologist-for-a-day experiences, observation of surgical pathology or rotation through the clinical labs.

Molecular Pathology

The discussants varied in their opinions as to the amount of emphasis that molecular pathology should be given during the pathology course. Individuals thought that these concepts would best be reviewed within a clinical context, taking care to include ethical considerations, as well as issues of genetic counseling. It was pointed out that this area within pathology may well provide an opportunity for faculty development.

Workshop #15 - Is the Post Sophomore Fellowship an Anachronism?

Co-Leaders: Daniel Sedmak, Robert Lee and Michael Prystowsky

No! A clear majority of two separate workshop groups felt strongly that the PSF programs were of value, despite all the changes in the current health care environment. Reasons for supporting PSF programs included the following: 1.) They allow medical students the opportunity to take a year off normal classwork so that they can consider their future careers while participating in the missions of a pathology department, 2.) Medical students can solidify their prior learning through teaching pathology to other students, 3.) PSFs contribute to the service mission of a department by working beside residents, 4.) PSF programs recruit future pathology residents, and 5.) PSF programs give students the opportunity to experience clinical or basic research.

Current concerns with PSF programs are over funding and credit for the 5th year of residency training. Currently funding is frequently from the hospital or from the pathology departments, but many expect funding to be increasingly a responsibility of departments. There is rare available funding from College of Medicine deans.

There is much consternation over the potential loss of credit of the PSF year towards the credentialing year. In many programs, PSFs are full participants in the residency experience and to deny them credit would be a failure to recognize all that they have learned. However, it was noted that there is a great diversity between the PSF programs of different pathology departments, ranging from a research experience with few anatomic and clinical pathology electives to a full year of anatomic pathology resident electives. Given this variability in experience, several workshop members were willing to consider the controversial prospect of more uniform and/or accredited programs.

In summary, regardless of source of funding or the issue of residency credit, the majority of workshop participants felt that PSF programs are not an anachronism. To many, these medical students bring an invaluable vitality to Departments of Pathology.

Workshop #17: Use of Computers in Pathology Education

Co-Leaders: Sherman Bloom and Robin R. Jones

That computers are a valuable adjunct to teaching medical students was taken for granted by virtually all participants in this well-attended workshop. In spite of this, the most animated discussion was related to problems associated with computer use. More than one participant feared that computers might be a captivating diversion for some. That they shifted focus from the primary objective, education, to an instrument of education, the computer. Furthermore, when computers are used effectively as tools of education they can become a substitute for direct faculty student interaction. This was thought to be something to be resisted so as to maintain faculty-student interactions at an appropriate level. However, it is not clear if the feared change in faculty-student interactions would prove to be a step forward or a step backward. Furthermore, it is possible that computer-assisted instruction (CAI) might actually increase faculty-student interactions through stimulation of students (at the computer) to ask the faculty about questions they have been left with after computer sessions. It was noted that some students intensely seek human interaction while others are less so inclined. It may be that some students learn best from books and computers while others do better with lectures, small groups, and other learning modes that involve human interactions.

Another problem, more tangible than the psycho-social aspects of CAI is the lack of support for computer education in many schools. There is no point in preparing teaching materials for CAI if computers are not available to students. Computers, space in which to use them, and sufficient technical staff to support the endeavor is just not available in many of the institutions represented by workshop participants. Some schools require all students to own a computer, but effective integration of CAI into the curriculum was thought to also require space for students to do computer work. One fear that technological variations might result in inequities of opportunity for learning among students, could be prevented or reduced if all students had exactly the same equipment.

Although a number of other points were brought out in the discussion, one particular concern may be worth bringing up here. That is the concern of some course directors that they would not receive academic credit for work they do develop or implementing CAI for their courses. They seem to feel that such work will not replace research as an academic index of value relative to promotion. If this true, we may have an issue here that needs to be worked through by department chairs and other academic leaders.

The co-chair for this meeting was Dr. Robin Jones, and many of the above points were brought out by his effective role in shaping the discussion.

GRIFE BUSINESS MEETING

'99 Winter Meeting

San Antonio, Texas

January 15, 1999 4:30 p.m.

Dr. James Newland, President, called the business meeting of the GRIFE membership to order at 4:30 PM, Friday, January 15, 1999 at the Plaza San Antonio Hotel, San Antonio Texas.

I. Approval of Minutes

Dr. Patsy Lill moved, Dr. Sanda Clejan seconded, the members present voted to approve the minutes of the '98 Summer GRIFE Meeting in Boulder Colorado.

II. Report from the President

Dr. Newland announced that the Summer meeting for 1999 will be held June 20th in Philadelphia in coordination with Slice of Life and Gold Standard Media's Computers in Healthcare Symposium.

III. Report from Dr. John Holliman, Executive Director of the GRIFE Central Office.

A. Reappointment of current chairpersons of the GRIFE Standing Committees.

Dr. Roger Geiss	Objectives
Dr. James Dixon	Multiple Choice
Drs Patsy Lill, Regina Kreisle, Ed Klatt	Software & Technology
Dr. John Holliman	Image Bank
Dr. Frank Sharkey	Clinical Cases Item Bank
Dr. Barbara Bosch	Case History Discussion Bank

B. Financial Report July 1, 1998 - November 30, 1998

Beginning Balance	\$51,564
Income	\$49,159
Expenses	\$26,541
Current Balance	\$74,182

Dr. Shirley Siew moved, Dr. John Pless seconded, the membership passed approval of the financial report. Attachment A.

C. Membership Report as of January 1, 1999

Institutional Subscriptions each with an individual member	54
Individual Members	73
Total Membership	127

D. Dr. Bernard Klionsky's efforts to recruit new members was recognized. Dr. Klionsky demonstrates the importance of personal contact and selling GRIFE as institution's professional obligation for the purpose of developing the quality of pathology education.

IV. Committee Reports

- A. Dr. Geiss reported for the Objectives Committee - They have a good beginning toward reviewing and adding objectives; work that began in Boulder. Dr. Byron Crawford and Dr. Geiss are working on the existing set of objectives which were last reviewed in 1987. New members are welcome and there will be more to report in Philadelphia. Dr. Geiss requested that members send objectives to the Central Office who will forward them.
- B. Dr. Dixon reported for the Multiple Choice Committee. The Central Office had received new questions; the committee reviewed and accepted most. Bad questions were removed. The committee recommends that a historical file be created to remove the items that are in the Both/Neither format and the K format. New questions are requested in the clinical vignette format. Some content experts are modifying questions and the committee asks that they be sent to Central Office. Dr. Dixon added that alphabetizing the foils improve reliability. The members discussed linking questions to objectives which is a future preference.
- C. Drs. Patsy Lill and Regina Kreisle reported for the Software and Technologic Development Committee. Forty-one photo CD sets have been sent to Institutions, check with your contact person for access. Our item bank is almost interactive. The Image Item Bank includes thumbnail images. Pete Anderson offered the use of his questions at his web address. Dr. Dixon asked that the Item Bank be programed so that the item and its performance data can be printed on the same page. Dr. Fred Dick demonstrated an atlas template he has developed. The tutorial is ready for beta testing. The software is fully editable by the recipient. The University of Iowa has given permission for GRIPE to distribute and use the atlas as a part of the benefits of our Institutional Subscription. Hopefully, it will be ready for the summer meeting.
- D. Dr. Holliman reported for the Image Committee - Fifty-five new images were submitted and the Image Bank Committee accepted 44. That makes 2879 total images in the Image Bank. Also, Dr. Wilson of the University of Nebraska retired, and Dr. Newland sent in Dr. Wilson's collection of electron microscopy kodachromes. These are to be digitized and housed at the Central Office and maintained as the Wilson Collection.
- E. Dr. Bhusnurmath suggested that GRIPE member's pictures be placed on the web site for network/identification purposes. We will try to bring a digital camera to the summer meeting.

V. Kent Award

Dr. Holliman reported that one nomination has been received. Please send nominations along with supporting letters by March 1. The Selection Committee is composed of the past four presidents of GRIPE. They will select from the nominations. An annual selection is not required, however.

VI. Old Business

- A. The current price of the GRIPE CD set of five discs with 2500 images is \$500 to members, \$750 non-members. Dr. Klionsky moved/Dr. Francisco seconded that we establish a \$1500 cost to non-members replacing the \$750 non-member price and that the CD member price apply only to Institutional Subscriptions and not to Individual Members. Discussion followed. Our current policy is

that individual members can buy the CDs at member price of \$500. The Central Office has sold CDs to three non-institutional members: Jerry Bartlett, an individual member purchased a set at member price, and two libraries, one in South Africa and one in Sweden bought CDs at the non-member price of \$750. There have been 41 CD sets sold. Dr. Holliman offered an amendment regarding institutional subscriptions. Dr. Francisco withdrew his second to the original motion and the motion died.

Dr. Dixon moved to sell CDs only to Institutional Subscribers. It died for lack of a second.

CD prices will stay the same: \$500 to Institutional Subscribers or Individual GRIPErs and \$750 to non-GRIPE members or subscribers. Dr. Bertha Garcia recapped the discussion pointing out that GRIPE's mission is to enhance pathology education.

Dr. Marjorie Fowler spoke of an idea of tagging images with GRIPE so they are continuous advertisement for the organization. New submissions to the Item Bank will have the GRIPE name superimposed on the image, much like the ASCP puts their name on their slides.

VII. New Business

- A. The Nominating Committee presented the following slate for 1999-2001 GRIPE Officers.

President	Dr. Roger Geiss
Vice President	Dr. Regina Kreisle
Secretary	Dr. Sebastian Alston

The chair opened the floor for nominations. Dr. Lee moved/ Dr. Siew seconded that nominations cease. The slate passed with a unanimous voice vote.

- B. The number of meetings to be held annually was the next item of discussion with much pro and con of various options for meeting every six months vs. only one annual meeting. No action was taken.
- C. Dr. Newland presented a proposal to clarify copyright policy on the GRIPE images. A proposed statement was distributed. Before adopting new policy it needs to be reviewed by an attorney. It was agreed by consensus to explore putting GRIPE on the kodachrome collection of almost 2900 slides.
- D. New Journal Editor
Dr. Newland announced the opening of the Editor position for the Journal. He will work with the new person for one to two issues, provide clerical work to print and mail from the University of Nebraska until the new editor is ready to publish the journal on his/her own. There was a request for book reviews and their submission to the Journal.
- E. The membership voted unanimously to continue our joint meeting with the Association of Pathology Chairs (APC) every third year. There was consensus regarding offering the Course Director's Workshop at these joint meetings. New course directors and chairs of the pathology departments will receive announcements. The format will be changed but it was generally agreed to repeat the core topics: i.e., images, objectives, statistics on testing.

- G. There was discussion about developing a relationship with the University Association for Research and Education of Pathology (UAREP). It is a small non-profit organization which funds grants to institution for residents to study trauma.

VIII. Future Meeting Locations

The Winter 2000 meeting will be hosted by Dr. Sanda Clejan and Tulane University in New Orleans. Date is January 19th for committees, meeting 20-22.

The Summer 2000 meeting is scheduled for the third week in June hosted by Drs. Pless and Kreisle at the University of Indiana and Purdue University at Indianapolis.

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