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Notes from the Chair

by Susan P. Pilbeam, MS, RRT

In September of 2001 I received a copy of a memo from AARC President Carl Wiezalis about tobacco education. The memo was directed to the president of the NBRC, Jackie Long-Goding, and the president of CoARC, Mel Welch. The content of the memo noted that the AARC Special Committee on Tobacco Education, Cessation and Research, chaired by Debby Cullen, had recommended to the AARC Board of Directors that the "Brief Clinical Intervention on Smoking," published by the Public Health Service [see *Respiratory Care* 45(10), 1196-1260; Ch.3] be included as a minimum curriculum component in the education of all respiratory care students. The Board accepted the recommendation and it has now been passed along to the NBRC and the CoARC through the memo to their presidents.

The hope of the Board and the Special Committee is that this will become at least the minimum level at which students are educated and tested with regards to tobacco-related education. I personally applaud the Special Committee on their efforts and encourage all educators to support this recommendation.

During late August and early September of 2001, a lively discussion was going on through the education listserv on the AARC web site. It began with a question about the CoARC thresh-

old requiring that at least 75% percent of graduates attempt the written registry exam and at least 65% take the clinical simulation exam. How is your education program doing with this requirement? How can you influence graduates to take an exam once they're out the door?

The discussion then moved to a question about what level of education should be required for minimum entry into the profession. An associate degree? A bachelor's degree? Should we keep things as they are or should we require a higher level of training? Why not go online and give your opinion!

The discussions also mentioned the NBRC job survey, how it's done, who fills it out, its usefulness, and whether it should stay the same or whether some changes are warranted. Have you ever participated in one of the surveys? Would you like to? Contact the NBRC for more information.

The point is, if you are not currently on the AARC education listserv, you're missing out. Please join us. Go to the AARC web site, click on "Community," then "Specialty Sections," then "Education," and follow the instructions to sign up. Be sure to have your AARC membership number handy, because they will ask you to enter it. ■

Notes from the NBRC

by Steven K. Bryant, MBA, NBRC executive director

The NBRC appreciates this opportunity to provide information to you through the *Education Bulletin*. Thanks go to Art Jones, RRT, the previous editor, as well as to Fred Hill, RRT, the current editor, for offering the space and encouraging this ongoing communications effort. In this column, I have provided some "basic" information regarding the operation of the NBRC, as well as some reminders about future credentialing changes of which you should be aware.

Getting your questions answered

You may have seen the recent discussion on the education listserv, which contained numerous questions and comments regarding the next job analysis study to be conducted by the NBRC, the move to linear computer testing as opposed to computer adaptive testing, participation rates for program graduates in the credentialing system, and the like. The NBRC does not routinely mon-

itor these listserv discussions, recognizing that individuals need the opportunity to "vent," freely express new ideas, and question issues among themselves without being put "on the spot" or made uncomfortable by having the NBRC officially engage in the debate.

However, this does not mean that the NBRC does not want to know your questions or provide the reasonable, respectful answers that you deserve. The NBRC responds to each and every inquiry received in the Executive Office by phone, letter, fax, or email. If you have questions about any credentialing related matter, the best way to get a response from the NBRC is to send them directly to us! While it is not always possible for us to provide the answer that someone is seeking or believes should be the Board's position, I can assure you that you will receive a reply. For email communications, you may contact me

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(sbryant@nbc.org) or Gary Smith (gsmith@nbc.org). We monitor our messages even when traveling on business and will respond promptly. For routine information or application requests, use nbc-info@nbc.org, or log on to the NBRC web site.

Admission policy changes effective January 1, 2002

Each accredited respiratory care education program has recently been sent an official notice from the NBRC regarding the admission policy changes implementing the associate degree entry level that will become effective January 1, 2002. You may have noticed that receipted delivery was used so the NBRC can have proof that your program has been notified. The reason for this is that *these changes are important and directly affect the eligibility of future program graduates for*

credentialing. The NBRC and all education programs have an obligation to these future graduates to make sure they are informed of the changes, so there are no "surprises" when they apply for credentialing. Please help us deliver the correct information to students in your program and let us know if there are any questions that need to be answered.

New admission policies for the CRT and RRT Examinations become effective January 1, 2002. They state that all individuals who enroll in accredited education programs beginning January 1, 2002, must graduate with a minimum of an associate degree to qualify for testing by the NBRC. Individuals currently enrolled in education programs or those who have graduated and are "in the middle" of the credentialing process have until December 31, 2005 to complete the examinations without being required to have an associate degree. Education programs offering baccalaureate degrees at the advanced level may apply to the Committee on Accreditation of

Respiratory Care (CoARC) to award an "associate degree equivalency certificate" so that students may qualify for the CRT and RRT Examinations before completing all degree requirements.

Content of future columns

In a future issue of the *Education Bulletin*, we will discuss the upcoming respiratory care job analysis, to be completed by the NBRC in 2002. We will review the past research and legal and technical standards for conducting such efforts, as well as the history of the current entry level credentialing system, the content of which is based on the job analysis results.

If you have suggestions for other issues that you would like to see addressed by the NBRC, we invite your comments. You may send your ideas to me in care of the NBRC Executive Office, 8310 Nieman Road, Lenexa, KS, or via email, sbryant@nbc.org. ■

The Nominees are In!

by Terry S. LeGrand, PhD, director of clinical education, department of respiratory care, University of Texas Health Science Center at San Antonio, San Antonio, TX

By the time you receive this issue of the *Bulletin*, we are likely to already have announced our 2001 AARC Education Section Specialty Practitioner of the Year at the AARC Congress.

This recognition is given to Education Section members who have made a significant contribution to the profession as respiratory care educators and/or who have served the Education Section in some capacity. Before we publish the winner in our next issue, however, we'd like to take a moment to recognize the many worthy nominees for this year's award.

The nominees for 2001 were Vijay Deshpande, MS, RRT, FAARC, Georgia State University, Atlanta, GA; Robert Fluck, MS, RRT, SUNY Upstate Medical Center, Syracuse, NY; William Galvin, MEd, RRT, Gwynedd-Mercy

College, Gwynedd Valley, PA; Edward Reardon, MS, RRT, Norwalk Hospital/NCC, Norwalk, CT; David Shelledy, PhD, RRT, RPFT, University of Texas Health Science Center, San Antonio, TX; Helen Sorenson, MS, RRT, Metropolitan Community College, Omaha, NE; and Jeffrey Ward, MEd, RRT, Rochester Community & Technical College/May Foundation, Rochester, MN.

Congratulations to all of you on the honor bestowed upon you by your peers in respiratory care education. ■

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Workforce Preparation: Selection and Assessment of Traditional versus Non- traditional Delivery Models in Post-secondary Education

by Jacqueline Rogers, MS, RRT, program director, department of respiratory care, Palm Beach Community College, Palm Beach Gardens, FL

A recent measure to hold institutions of higher education accountable for the instruction that takes place within classrooms, laboratories, and clinical settings has been responsible for changes in delivery and assessment models. Instead of assessing how many students apply, get accepted, and enroll, colleges are assessing the outcome of education; namely, the number of graduates, the success rate on their credentialing examinations, the percent employed, and employers' satisfaction. While this type of assessment is not new to programs preparing students for health science careers, the "outcome-based assessment" does not entirely rely on "outcome-based education." Emphasizing outcomes, however, allows more flexible pathways for achieving them. This paper

will provide an overview of both the traditional and non-traditional educational models, characteristics and benefits of non-traditional methods, and how models measure in the final outcome.

An overview of traditional education

Education has always had outcomes. Students are expected to know certain things before receiving a diploma. Traditional education models provide a body of knowledge to students called the curriculum. Within the curriculum, there are certain numbers of classes that students are required to complete called credits or Carnegie Units

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(Williams, 1994). When the total number of required and elective credits has been obtained, the student is eligible for graduation. The central tenet of the traditional model is based on the fact that knowledge provides the foundation to develop skills for a career and the basis for lifetime learning. Students demonstrate their mastery of the information by taking tests to which grades are assigned. Non-passing grades require the student to repeat the class to receive credit. It is posited that general education course work provides the student with needed wisdom and judgment and an awareness of the human experience from historic study of their predecessors (Williams, 1994). The outcome of education should be student success in whatever field of endeavor they choose. In restructuring education, specific outcomes of teaching and learning are those observable and measurable by ongoing research (Clark, 1999; McNeir, 1993). The focus on teaching and learning then becomes outcome-driven rather than input-driven.

History of non-traditional education models

The Outcome-Driven Delivery Model espoused by Albert Mamary promised success for all (Blust, 1995; McNeir, 1993; Williams, 1993). The outcome-based education model proposes graduates of this model become self-directed learners who create positive vision, set achievable goals, evaluate their own progress, and assume responsibility for their actions. Leadership and team skills are the result of collaboration in the classroom. Graduates develop critical thinking skills, contribute to their community, and produce quality work (Lederman, 1994). Outcome-based education is not new to educators. Benjamin Bloom, inspired by Harvard research professor B.F. Skinner, developed the idea of *higher order* thinking skills. The lower order realm includes knowledge and comprehension, but higher order skills include *synthesis, application, and evaluation* (Williams, 1994). Research in this area led to Bloom’s approach to thinking as *cognitive* (dealing with reasoning or rationale) or *affective* (dealing with feelings, emotions, beliefs, attitudes, and values). Skinner’s previous research on behaviorism gave the third dimension of *psychomotor* or motor skill abilities.

Learning domains

One of the goals of any training process is development of the learning domains: cognitive, affective, and psychomotor. Within each domain lie degrees of difficulty where mastery of one must take place before moving onto the next degree (Clark, 1999a). The *cognitive* domain has six degrees of difficulty: *knowledge, comprehension, application, analysis, synthesis, and evaluation*. In health science education, the *knowledge* category requires the individual to recall data such as policies and procedures, and more recently, protocols by which patients are treated based on their need and response to interventional therapy. Moving from the simplest to more complex behavior, *comprehension* follows recall. The indi-

vidual is able to restate the recalled data. An *application* category follows wherein the individual applies his/her knowledge. This is followed by *analysis*. In this category, the individual troubleshoots situations that may be different from those previously encountered. Next, *synthesis* enables revision of the application, and finally, *evaluation* occurs when effectiveness is judged and critiqued. The cycle continues in a circular fashion. The recognition of facts, procedures, patterns, and concepts (knowledge) serve to further develop abilities and skills. Students can develop this domain in classroom, laboratory, and clinical settings using only mental thought processes and direct observation of their mentor.

Development of the emotional and attitudinal domain is called the *affective* domain. This domain contains five major categories: *awareness, participation, valuing, organization, and internalization*. The first category — awareness or active listening — is the reception of phenomenon. *Participation* follows and involves questions about the phenomenon — an area well served by class discussions. *Valuing* demonstrates social sensitivity; the internal value system governing the rational being. Following this category is *organization*, which prompts the prioritization of values, balancing responsible behavior and developing professionalism. The last category in this domain — *internalization* of values — requires a consistent pattern of adjustment, especially if personal values are not aligned with expected professional values. Projects that utilize teamwork and collaboration allow students to constantly review and make adjustments to their value system (Clark, 1999a). It has been observed that the *affective* domain is the most difficult to develop; however, personal experience has shown that positive changes can occur over time. People need to be drawn into the learning, not have the learning poured into them. The learning point can be made by supporting personal beliefs and values, reminding learners of their goodness, and framing learning in a positive light even when mistakes are made. This affirms good intentions. Attitude coupled with skill and knowledge equals performance. Performance is the accomplishment of a task in accordance with a set standard of completeness and accuracy. People with only skill and knowledge may be competent, but the addition of attitude gives the desire to perform (Clark, 1999a).

The use of physical movement, coordination, and motor skill activity comprises the *psychomotor* domain of learning in which there are seven major categories typically measured in terms of speed, precision, and execution of techniques. The categories are *perception, mindsets, guided response, mechanism, complex overt response, adaptation, and origination*. *Perception* tops the list and includes the detection of sensory cues. Knowing and acting on a sequence of steps is the next category of mental, physical, and emotional *mindsets*. This subdivision overlaps the affective domain. The learner is eager and may not recognize limitations. This stage describes the learner as *unconsciously incompetent*. The *guided response* category occurs when the student practices the skill by imitating the role model or mentor. This area is best developed in the laboratory

where students can practice skills repeatedly, or very early in the clinical setting. Having observed the clinical preceptor, the student is provided the opportunity to initiate some form of work *guided* by the mentor. Following this stage is *mechanism*, an intermediate stage where the learner has some proficiency and confidence. But his actions still need manipulation. In this stage, the learner is *consciously incompetent*. The *complex overt response* category follows, where there is an automatic performance carried out with precision and without hesitation. The learner is *consciously competent*. An accurate response to unexpected situations describes the category of *adaptation*, where the learner is *unconsciously competent*. Behavior at this stage of development is articulated and naturalized. The last category in this domain is origination, where the learner constructs new theory from knowledge. This is also called the creative stage (Clark, 1999a). An understanding of the categories within each learning domain will enable the instructor to recognize the learner’s stage of development. Learning occurs in all three domains sequentially and concurrently. Knowledge (cognitive), together with skill (psychomotor) and attitude (affective), provides observable behavior necessary for formative and summative evaluation to improve student performance and the teaching and learning process (Clark, 1999a; McNeir, 1993).

Mastery learning

Bloom further developed his philosophy into a teaching methodology called Mastery Learning, originally conceived by John Carroll in 1963 and referred to by this name until the early 1980s (Education Commission of the States, 1995). Mastery Learning is an instructional strategy espousing all students can learn reasonable objectives with appropriate instruction and sufficient time (Battistini, 1995; Blust, 1995; McNeir, 1993; Ryan, 1995; Williams, 1994). Students are required to demonstrate competency in specified cognitive, affective, and/or psychomotor skills. Courses are divided into units that are sequentially organized so that prerequisite material is addressed before more complicated material is covered (Barshis, 1983). Many school districts in the late 1970s undertook Mastery Learning Programs using curriculum that followed the work in behavior psychology of Harvard University’s B.F. Skinner. One of the most important aspects of this type of work was realizing that behavior could be modified. Following a meeting of Bloom and his disciples it was decided to change the name of Mastery Learning because of negative public reaction to the “values clarification” aspect of the strategy. Hence the name change to Outcome-based Education (Williams, 1994). Dr. Robert Slavin, researcher for Johns Hopkins University Center for Research on Elementary and Middle Schools undertook a study of Mastery Learning for the U.S. Department of Education’s Office of Educational Research and Improvement. His conclusions, published in January, 1987 in his *Mastery Learning Reconsidered*, revealed that all students

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slowed in the learning process when using the Mastery Learning strategy; the fastest learners slowed considerably and the slowest slowed even more (Williams, 1994). Opponents of this educational strategy claim giving students multiple chances at succeeding offers no incentive to complete work well and on time. The best students do not move forward until everyone succeeds and failure is impossible (Barshis, 1983; Tancredo 1994; Williams, 1994). Ryan (1995) reported research studies showed mastery learning to have a profoundly positive impact on student achievement, retention, transfer of learning, and student affect.

Outcome-based education

Demonstrable, specific outcomes are important educational strategies that have been employed in the classroom for centuries. This strategy encompasses all aspects of pedagogy, from philosophies of learning to psychomotor conditioning, attitudinal modifications, and job placement (Tancredo, 1994). The structure stresses clearly defined objectives, criterion-referenced measures of success, instructional strategies related to students' needs, and flexible use of time (Ryan, 1995). Outcome-based education (OBE) shifts the process from instructional inputs (money, instructor-to-student ratios, technology, and staffing) to outputs or what students know and can do at the end of their program (Lederman, 1994; McNeir, 1993). OBE has been deemed analogous to Total Quality Management in business and industry. The community-of-interest determines what skills and knowledge are required (meaningful outcomes) and the curriculum is planned backwards to develop strategies, performance standards, and materials that relate to the *real world* (Blust, 1995; Education Commission of the States, 1995; McLaughlin, et al. 1995; McNeir, 1993; Williams, 1994). Both students and instructors take responsibility for successful learning outcomes, but the instructor is key to the success of OBE. Ongoing instructor evaluation during the learning process assures each student is progressing. Time allowed for learning is varied according to the needs of individual students and task complexity. Once a task is completed, evaluation is used to improve instruction. Progress toward terminal goals is measured by benchmark evaluation of student performance against standards. Comparing students to themselves to determine change over time can assess measure of early progress. Implication of this type of formative evaluation is reliability, and it provides the ability to improve instruction (McLaughlin, et al. 1995). Students are assigned projects and reports, partnered for peer instruction and evaluation in pairs or small groups participating in classroom decisions (Battistini, 1995).

William Spady, educational consultant and the nation's foremost guru of OBE since the early 1980s, preaches that learning institutes could not be successful until they were transformed, creating learning that extended beyond the walls to the community and was applicable to daily life

(Blust, 1995; Williams, 1994). Critics of OBE say its goals are more *affective* than *academic*, dealing too much with attitude and feelings (Blust, 1995; McNeir, 1993). Opponents claim OBE de-emphasizes content in favor of outcomes and is a means to an end lacking research base. Proponents, on the other hand, claim OBE has vision where knowledge, skill, and attitude provide results in performance with accuracy and completeness (Clark, 1999b; McNeir, 1993).

Competency-based education

Vocational curriculums are built around performance objectives that reflect tasks performed by individuals in a particular job or profession. These tasks are identified or verified ideally by business or industry representatives, promoting communication between the educational institute and the workplace (Harris, 1995). Students receive specific information regarding which performance competencies are to be acquired, and instruction proceeds sequentially from the simpler material to the more complicated. Similar to the Mastery Learning model, students do not advance to the more complicated material until they demonstrate specified minimum-level competency (ERIC Editorial, 1984). Competency standards are propelled as the way to prepare the workforce for a competitive global workplace. Chappell (1996) suggested competence is a contested concept shaped by those who use it. Competencies are the tools for motivating individuals, directing systems and processes, and guiding individuals toward common goals (Clark, 1999b). To be competent is to be qualified to perform a task synonymous with ability. The components of competence are knowledge, skill, and abilities. However, according to Clark (1999b), competency is not synonymous with performance. Performance is having the desire (attitude) to complete the competency correctly. Stated another way, competencies give a person the **ability** to perform, while attitude gives a person the **desire** to perform. Given the difference, it would be more appropriate to label this type of education as performance-based, indicating a well-developed affective domain. It has been stated that employers “hire for attitude,” suggesting that having a positive attitude is a highly valuable characteristic (Shapiro, 1997). Coupled with attitude, skills and knowledge provide observable behavior that can be assessed. The checklist-approach to assessing competence is de-motivating, suggesting only minimal competence and not a standard of excellence (Hager, 1995).

Competency-based education, seen as skill standards set in a theoretical framework, has been used in the U.S. since the 1970s. In vocational education, it provides portable skills, a predictable level of competence, and graduates who report being well prepared for the *real world* setting. Competency-based education bridges the divide of head and hands, mind and spirit, theory and practice, ideal and real world, and general and vocational education (Lankard, 1995).

The broad approach to competence is integrated, holistic, or relational. The integrated view reflects complex combinations of knowledge, attitudes, skills, and values displayed in the perfor-

mance of a task that recognizes levels of competence — entry, experienced, specialist, or advanced. Holistic views reflect how behavior is not trained but comes about through the developmental process. A relational view acknowledges that cultural context and social practices are involved in competent performance and reflect that personal attributes contribute to achieving outcomes (Goncz, 1997; Hager, 1995). Opponents of competency-based education believe skills are society constructs or cultural practices. Proponents believe competency standards are closely tied to global competitiveness and accountability (Collins, 1993; Harris et al., 1995). Clark (1999b) describes three types of competencies: core, professional, and specialty. He relates the core competencies as those attitudes essential to the workplace culture; professional competencies are the technical skills required by the job or profession; and specialty competencies are a combination of core, professional, and a third set that includes leadership skills.

Assessment and accountability

Educational institutions are being held accountable by internal and external pressures. External pressure comes from state coordinating and governing boards reacting to pressure from legislatures, business, and the public to report outcomes. Internal pressure comes from budgetary disbursement and study of the cost/benefit ratio. Higher education administrators question at what point the institution spends more resources responding to external demands than improving teaching and learning.

Assessment is synonymous with accountability. How well assessment relates to teaching and learning is crucial (Cress, 1996). Assessment helps improve performance. Formative and summative assessment is necessary for ongoing evaluation to improve teaching and learning (Clark, 1999b). Assessment systems must accurately measure how well outcomes are being met. New assessment approaches attempt to record complex performance, representing an array of student abilities measuring demonstrated capabilities. Technology has found a role in assessment, and use of computers is expanding. Computer simulations offer students the ability to consider variables, test hypotheses, and formulate quantitative relationships of dependent and independent variables. In this type of media, students may test themselves as novices using tutorials imbedded in the software. As they gain a better understanding of the concepts, students can advance in the difficulty level and rely less on the tutorial program. Videotaping the student presentations provides a means for students to critique their own work. Oral presentations judge the student's depth of understanding by assessing clarity, coherence, responsiveness to questions, and listening abilities. Paired explanations measure listening and explaining abilities. In the paired explanation method, one student presents information to another and then students reverse their roles. The quality of questions, the ability to summarize

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material, and the ability to make ideas clear assesses learning abilities.

Assessment also means researching outcome data to determine program or course success. Health science programs look at attrition rates, success rates on credentialing examinations, job placement, and retention rates in the field. Employer and graduate satisfaction is also surveyed. Standardized assessment instruments have thresholds to which programs are held accountable. An outcome measurement that falls below the program threshold risks the loss of accreditation, reputation, and state financial subsidies. Increasing pressure from accreditation bodies, legislators, taxpayers, and students themselves has called upon colleges and universities to “prove” efficiency and effectiveness (Cress, 1996).

Conclusion

There is a need for accountability in any instructional strategy and perhaps it will be found that the best strategy may be the integrated model. Analogous to an umbrella, the center pole represents performance standards, the umbrella canopy itself represents outcomes, and the supports of the canopy are the instructional strategies or delivery methods. Whether the model is Mastery Learning, Outcome-based Education, Competency-based Education or a blend, evidence of proficiency in preparing the workforce is central to the college’s or university’s reputation. Educators must document that actual learning accompanies the degree or certificate of completion awarded.

Ongoing formative evaluation allows both students and instructors to improve the teaching and learning process. Summative evaluation provides outcome assessment necessary to make

changes in delivery strategies. Surveys of employers determine the level of satisfaction with knowledge, skill, and attitude of graduates in the workplace. Surveys of graduates determine how prepared they are for their career. These data must be used to make meaningful changes where necessary. Our mission as educators must continually focus on selecting the appropriate delivery method, assessing its effectiveness, and preparing graduates who are ready (cognitive), willing (affective), and able (psychomotor) to compete in the global workplace.

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Maybe You Have Had a Similar — er — Simile Experience?

by Bill Pruitt, MBA, RRT, instructor, cardiorespiratory department, University of South Alabama, Mobile, AL

Another school year has started and we are back in the groove, making sure all our students are getting what they need and demonstrating their competency in their clinical rotations. I’m relatively new in the role of educator, but I’m enjoying it and hope my enthusiasm for the field is spilling over on my students. As I have become more accustomed to teaching, I’ve found that using similes often makes a point stick and the little light bulb of understanding go off just above the student’s head (if you have done any teaching, you know what I’m talking about). Unfortunately, sometimes my imagination gets the best of me and I pop out with a simile that makes my students do a double-take and scratch their heads.

One instance that comes to mind happened as I stood by a patient’s bed with three of our first-year students, explaining the proper technique for performing incentive spirometry. “It’s like a turtle,” I said as I took off on my journey down the road of “there-goes-Mr.-Pruitt-again” and my

students froze, waiting to hear how I was going to connect this to reality.

“You know, a turtle. You have to go deep and slow like a turtle to do this procedure correctly.” “Take a deep, deep breath, but do it very slowly, like a turtle in the water.”

“Oh. . . OK, I guess that makes sense,” came the response from one of my students.

The patient looked at me with suspicion, but took the device and took a good, slow, deep breath for me. Like a turtle.

One other instance that comes to mind has become a classic in the area of “open-mouth, insert-foot.” I was with two students in the pulmonary function lab, working to measure the lung functions of a middle-aged female patient.

“In order to get the best, most reproducible tests, you have to really coach and motivate your patients to give their optimum performance,” I explained, talking to the students. “You have to be very emphatic in you instructions, with a commanding “Now . . . BLOW!!” Then, my mind

clicked into the dreaded let’s-make-a-simile mode and I spoke up:

“It’s like watching TV at home and you look around just in time to see your dog lifting his leg to relieve himself on your living room rug. You don’t quietly, calmly speak to the dog, “Stop that, don’t do that, boy . . . You’ll most likely holler, ‘STOP!!! GET OUT OF HERE!!!’, Right?”

The students both nodded in agreement.

“Well, that’s the way you have to approach this,” I said, pointing to the PFT equipment. Then, my patient spoke up. “Young man,” she said with a bit of indignation, “are you calling me a dog?” The students choked back their laughter as I sputtered and apologized, trying to get back to the professional standing that I had just dropped on the ground and stepped on with my big feet.

A simile really can help get the point across. You just need to be careful not to let one fly before thinking. You know, like a bottle rocket in a bathroom . . . or a bald man in a pizza place. . . ■

Assessing Student Understanding in the Classroom

by Dennis R. Wissing, PhD, RRT, professor, department of cardiopulmonary science, school of allied health professions, LSU Health Sciences Center, Shreveport, LA

Over the past several decades science education research has supported the belief that a gap exists between what is taught in the classroom and what students actually learn. As a respiratory care educator I have become increasingly aware of gaps in my students' understanding of a number of key concepts.

In an effort to better assess students' understanding of respiratory care topics, the focus of my own research has shifted from the laboratory and clinical setting to the classroom. I found that the more I investigated students' understanding of respiratory care concepts, the more gaps in conceptualization I discovered. In response to these findings, I now employ a variety of assessment tools to uncover gaps in understanding as well as conceptual development.

Traditional education often includes over-dependence on rote memorization of lecture and textbook information, confirmatory laboratory exercises, teacher-generated worksheets, and listing of facts in a disconnected manner. Educators often attempt to transmit concepts and ideas that are meant to be relatively precise but at times are actually quite vague, unconnected, and laden with facts.

In an attempt to overcome the temptation of traditional teaching strategies, I set out to explore how students develop key concepts and apply them in clinical practice. My attempts, founded on the principle of human constructivism, employed several assessment strategies, including, in part, paper and pencil examinations, clinical interviewing, and concept mapping. The focus of several of my research studies concentrated on how students developed concepts related to oxy-

gen transport and delivery and the mechanics of ventilation. One concept I believe is essential in understanding oxygenation and mechanics of ventilation is the role of the functional residual capacity (FRC) in maintaining oxygenation and reducing the work of breathing. I have come to appreciate that most, if not all, respiratory care procedures are aimed at restoring or maintaining the FRC. Since this is such a key concept, it is prudent for educators to ensure that students acquire a full understanding of the role of the FRC and strategies to maintain it.

Results of pencil and paper examinations in several courses such as cardiopulmonary physiology, pulmonary pathophysiology, and advanced critical care indicated an understanding of the FRC and related concepts. Multiple choice or short answer items often were answered correctly, giving the instructor a false sense that students understood the role of the FRC. Use of non-traditional assessment techniques such as interviewing and concept mapping resulted in the identification of gaps in understanding or alternative conceptions.

An interview with each student following a traditional pencil and paper examination revealed a number of significant gaps in their understanding. A simple 5-10 question interview with recorded results yielded nuances of misunderstanding and blatant gaps not identified by the pencil and paper exams. Student responses were recorded and transcripts created for qualitative analysis. Analyzing these transcripts allowed me to identify trends in concept development and gaps in understanding. Although interviewing students and data analysis were time consuming,

results were significant enough to justify the time spent.

To complement data derived from the interviews, students completed a series of graphic organizers called concept maps. Concept maps are two-dimensional representations of a set of concepts. The concepts are arranged in a hierarchical manner with a superordinate concept at the top. Additional concepts are linked by lines labeled with connecting words that form propositions uniting the concept. Student-generated maps illustrated their understanding of a particular concept. The concept maps were analyzed and poorly developed concepts, learning gaps, and alternative concepts were identified.

Data revealed that many students never developed a good understanding of what FRC is and how it is linked to lung function. Despite my best efforts to get this single concept across in the classroom, some gaps in understanding persisted. After having conducted these studies with associate and baccalaureate respiratory care students from my own program, as well as those from other programs in the region, my research identified consistent gaps in understanding FRC concepts.

Without effective periodic assessment of what the student actually does and does not understand, the respiratory care educator fails to identify students processing significant gaps in their understanding. Consequently, students progress through the educational process missing key elements and concepts. Once students become practitioners, poorly formed concepts can remain, thus compromising their delivery of respiratory care. ■

Student Scholarship Award Winners

by Susan P. Pilbeam, MS, RRT

Six students were honored with Lambda Beta Scholarships for the year 2000 at the 2000 AARC International Congress held in Cincinnati, OH. The *Education Bulletin* has published two of these articles so far this year. One, by Roxanne Nora titled "Meconium Aspiration Syndrome" was published in the March/April 2001 issue. Another by Stephen Reynolds on "Synthetic Surfactant Treatment for Pre-term Infants with Respiratory Distress Syndrome" was published in the May/June 2001

issue.

The additional four winners also wrote exceptional papers. We wish there were adequate space to publish all of them, particularly before the next International Congress this December in San Antonio. Unfortunately, we're running out of space and time. But to recognize these efforts we are publishing a summary of these papers, along with their authors, in this issue. If you wish to obtain a full copy of any of the papers, contact me at the

addresses/numbers listed on page 2.

Our next issue will feature similar information about ARCF Student Scholarship winners from 2000. It is undoubtedly a source of pride and pleasure for faculty members who are directly involved with these bright and hardworking students to see their efforts published. We hope this will also encourage other faculty to actively motivate their students to submit papers. ■

Nebulized Lidocaine: An Alternative Treatment For Glucocorticoid Dependent Asthma Patients

Lori Ingalls, RRT, Mayo Foundation, Rochester, MN

Asthma affects a significant number of people in the United States. Today, several classes of drugs are used to treat asthma symptoms. Corticosteroids, although useful to treat the inflammatory component of asthma, can produce

unwanted side effects such as growth retardation and osteoporosis when taken systemically. Lidocaine, applied topically to the airway via nebulizer, has been shown to possess anti-inflammatory properties with minimal side effects and tox-

icity. This paper provides the reader with a review of current literature concerning the use of lidocaine as a "non-traditional" therapeutic agent for the treatment of asthma. ■

Take a Deep Breath

Rachel J. Robertson, Medical College of Georgia, Augusta, GA.

Fourteen million Americans suffer from chronic bronchitis, making it the seventh-ranking chronic condition in this nation. Chronic bronchitis therapy is directed at control of inflammation, infection, bronchoconstriction, and mucus production. Therapy includes pharmacologic agents, appropriate diet, possibly the use of vitamins E and A, and antioxidants, in addition to exercise

and oxygen and humidity therapy. Respiratory therapists are indispensable in the diagnosis and treatment of chronic bronchitis. They become involved in the development of the discharge plan and in the home setting, select and maintain equipment, assess the patient, and educate the patient and family. Should the patient be able to function in a pulmonary rehabilitation program,

the respiratory therapist's role is mainly one of teacher. Considering the current health care environment, which encourages earlier release from hospitals and other changes in insurance reimbursements, the respiratory therapist's role is expanding to become one of a manager of treatments and equipment as well as provider of direct treatment to the patient. ■

Breathing Easier with Asthma: Patient Education and the Role of the Respiratory Therapist

Edith Martin, Medical College of Georgia, Augusta, GA

Statistics related to the number of people with asthma and the associated hospitalization and mortality suggest that better adherence to effective asthma management strategies can improve morbidity and mortality. A review of pathophysiology, symptoms, and current treatment trends are included in this paper. A summary of the NAEPP Guidelines reviews four key components to the management of asthma. The primary educational messages for patients are reviewed along with the importance of beginning their education at the

moment of diagnosis.

Not only should the patient with asthma be involved in the education process, but also family members, friends, teachers, school employees, employers, and others who interact with individuals diagnosed with asthma. The numerous resources available to provide asthma education are briefly reviewed with emphasis on the importance of selecting appropriate materials. Physicians and other members of the health care team are the most important resources for asthma

education, making it essential to establish and develop a partnership between the patient and the entire health care team. Since physicians often lack the time required for the patient to become completely knowledgeable about asthma, the respiratory therapist becomes vitally important in this role. With asthma death rates increasing, it is more important than ever that asthma patient education be implemented at every opportunity and to every asthma patient. ■

Pediatric Asthma

Kelly Ritchie, Medical College of Georgia, Augusta, GA

Asthma affects an estimated 4.8 million children under the age of 18 in the United States. This paper reviews the pathophysiology, symptoms, diagnosis, and current management of asthma. Self-management and education programs are discussed. Self-management is imperative for improving health outcomes for children and their families. The traditional role of the respiratory therapist is to administer aerosol treatment to

asthmatics. However, there are increased responsibilities for the respiratory therapist in the management and education of the asthmatic patient. Respiratory therapists possess the academic background necessary to educate patients, their families, and even school teachers and staff about treating asthma.

The active involvement of respiratory therapists in legislative matters is crucial for the suc-

cess of the profession. The Florida Society for Respiratory Care advocated for and received legislation that involves direct reimbursement to a Registered Respiratory Therapist for services provided to Medicaid pediatric clients. This includes asthma education. A challenge has been placed before respiratory therapists who are trained and capable of accepting the challenge of educating children with asthma. ■

Get it on the Web

Want the latest news from the section in the quickest manner possible? Then access the *Bulletin* on the Internet! If you are a section member and an Internet user, you can get your section newsletter a week and a half to two weeks earlier than you would get it in the mail by going to your section homepage at: http://www.aarc.org/sections/section_index.html. You can either read the *Bulletin* online or print out a copy for later.

The AARC is encouraging all section members who use the Internet to opt for the electronic version of the *Bulletin* over the mailed version. Not only will you get the newsletter faster, you will be helping to save the AARC money through

reduced printing and mailing costs. These funds can then be applied to other important programs and projects, such as ensuring effective representation for RTs on Capitol Hill.

To change your option to the electronic section *Bulletin*, send an email to: mendoza@aarc.org. ■

Submission Guidelines For Bulletin Articles

All section members are encouraged to share information about their programs through articles in the *Bulletin*. Here are our guidelines for submission:

Article length: *Bulletin* articles may be between 500 and 1,000 words.

Format: In addition to a paper copy, all articles must be submitted on a 3 1/2 inch floppy disk saved in Microsoft Word or TEXT ONLY (ASCII) formats, or e-mailed to the editor in one of those formats.

Deadlines: All articles must be submitted to

the editor according to the following schedule of deadlines-

- Jan.-Feb.: December 1
- Mar.-April: February 1
- May-June: April 1
- July-Aug.: June 1
- Sept.-Oct.: August 1
- Nov.-Dec.: October 1

Article Review: All authors may review a copy of their article before it goes to press. If you would like to review a copy of your article, please include a FAX number when you submit it to the

editor. It is the responsibility of the author to: 1) request the opportunity to review the article before it goes to press, and 2) contact the editor by the stated deadline if any changes need to be made before the article goes to press.

Send Submissions To: Fred Hill, MA, RRT, Department of Cardiorespiratory Care, College of Allied Health Professions, University of South Alabama, 1504 Springhill Avenue, Room 2545, Mobile, AL 36604, (334) 434-3405, email: fhill@jaguar1.usouthal.edu. ■

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