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 tobacoo 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 listserve on the AARC web site. It began with a question about the CoARC threshold 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 listserve, 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 listserve, 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 monitor these listserve 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@nbrc.org) or Gary Smith (gsmith@nbrc.org). We monitor our messages even when traveling on business and will respond promptly. For routine information or application requests, use nbrc-info@nbrc.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@nbrc.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.

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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, MSED, 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.

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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Bloom’s approach to thinking as

Bloom, inspired by Harvard research professor

education is not new to educators. Benjamin
quality work (Lederman, 1994). Outcome-based
team skills are the result of collaboration in the
goals, evaluate their own progress, and assume
graduates of this model become self-directed
all (Blust, 1995; McNeir, 1993; Williams, 1993).

Development of the emotional and attitudinal
domain is called the affective domain. This
domain contains five major categories: aware-
ness, participation, valuing, organization, and
internalization. The first category — awareness
or active listening — is the reception of phenom-
enon. Participation follows and involves ques-
tions about the phenomenon — an area well
served by class discussions. Valuing demonstrates
social sensitivity; the internal value system gov-
erning 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, espe-
cially 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 val-
ues, 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 addi-
tion of attitude gives the desire to perform (Clark,
1999a).

The use of physical movement, coordination,
and motor skill activity comprises the psychomo-
tor 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 of the affective
domain. The learner is eager and may not recog-
nize limitations. This stage describes the learner
as unconsciously incompetent. The guided
response category occurs when the student prac-
tices the skill by imitating the role model or men-
tor. This area is best developed in the laboratory

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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 evalua-
tion (Williams, 1994). Research in this area led to
Bloom’s approach to thinking as cognitive (deal-
ing with reasoning or rationale) or affective (deal-
ing with feelings, emotions, beliefs, attitudes, and
values). Skinner’s previous research on behavior-
ism 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, comprehen-
sion, application, analysis, synthesis, and evalu-
tion. In health science education, the knowledge
category requires the individual to recall data
such as policies and procedures, and more recent-
ly, protocols by which patients are treated based
on their need and response to interventional ther-
apy. Moving from the simplest to more complex
behavior, comprehension follows recall. The indi-
vidual is able to restate the recalled data. An applica-
tion category follows wherein the individ-
ual applies his/her knowledge. This is followed by
analysis. In this category, the individual trou-
bleshoots 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, pat-
terns, and concepts (knowledge) serve to further
develop abilities and skills. Students can develop
dis 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 impor-
tant 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 clarifica-
tion” 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.

Mastery learning

Bloom further developed his philosophy into
a teaching methodology called Mastery Learning,
orinally 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
exposing all students can learn reasonable objec-
tives 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 sequential-
ly organized so that prerequisite material is
addressed before more complicated material is

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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

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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, required (meaningful outcomes) and the curriculum (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; McNIEIR, 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, required (meaningful outcomes) and the curriculum (Ryan, 1995). Outcome-based education (OBE) stresses clearly defined objectives, criterion-referenced measures of success, instructional strategies related to students’ needs, and flexible use of time (Ryan, 1995).

Opponents, on the other hand, claim OBE has a 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 institution 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 competence (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 synonymously 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 (Laurie, 1995).

The broad approach to competence is integrative, holistic, or relational. The integrated view reflects complex combinations of knowledge, attitudes, skills, and values displayed in the performance 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 (GONZI, 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 Education or a blend, evidence of proficiency in Outcome-based Education, Competency-based methods. Whether the model is Mastery Learning, canopies are the instructional strategies or delivery that the best strategy may be the integrated model.

Conclusion

1996). has called upon colleges and universities to legislators, taxpayers, and students themselves program threshold risks the loss of accreditation. An outcome measurement that falls below the program threshold risks the loss of accreditation, reputation, and state financial subsidies. Increasing pressure from accreditation bodies, to the professional standing that I had just accumulated "there-goes-Mr.-Pruitt-again" and my little light bulb of understanding go off just above the student’s head (if you have done any teaching, using similes often makes a point stick and the student's head). I stood by a patient's bed with three of our first-year students, explaining the proper technique for their competency in their clinical rotations. 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 out of control and I pop out with a simile that 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.

One other instance that comes to mind has to do with the professional standing that I had just accumulated. “Oh. . . . OK, I guess that makes sense,” came the response from one of my students.

The patient looked at me with suspicion, but this,” I said, pointing to the PFT equipment. “STOP!!! GET OUT OF HERE!!’, Right?” The patient both nodded in agreement.

The 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. "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 onrote 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 oxygen 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 toxicity. 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 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.

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

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