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The Self-Reported Values and Abilities of Respiratory Therapy Students

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Abstract

This study examined the work values, abilities, and reading levels of respiratory therapy students in six states, using the Career Decision-Making System Revised (CDM-R) and the Ability Explorer (AE) instruments. Data were analyzed for variables of gender, grade, and type of institution and for correlation between CDM-R and AE. The top four work values for all students were work with people, good salary, job security, and high achievement. The top four work abilities on the CDM-R were social, scientific, teaching, and manual. The results indicated that abilities and values related to leadership, prestige, and independence emerge as students progress through the 4-year curriculum; attrition in programs may be, in part, related to lack of confidence in ability to learn science; and attention to teaching strategies, learning styles, and building self-confidence may help students be more successful in programs.

The Self-Reported Values and Abilities of Respiratory Therapy Students

The respiratory therapy profession has been faced with high program attrition rates as well as a lack of professional fulfillment among practitioners, leading to a high attrition rate in the field. Shelledy, Youtsey, and Rau (1992) showed that 4-year graduates had higher job attrition and were more likely to leave the field than graduates of 1- and 2-year programs. Douce and Coates (1984) found that the attrition rate of all types of respiratory therapy programs was 26%. Attrition has not improved since then; in fact, there is evidence that it has increased. The Joint Review Committee for Respiratory Therapy Education (1995) reported that the average attrition rate for therapist programs over the past 10 years was approximately 30% and as high as 40% and 50% for technician programs.

The concern in respiratory therapy over issues of attrition from educational programs, job satisfaction, burnout, turnover of employees, and employee effectiveness has been the focus of many studies in the past (Akroyd & Robertson, 1989; Douce & Coates, 1984; Plunkett & Polli, 1983, 1985, 1986; Prewitt, 1985; Rawlins, 1987; Shelledy & Mikles, 1987; Shelledy, Mikles, May, & Youtsey, 1992; Shelledy & Youtsey, 1990). These issues continue to be important challenges for respiratory therapy educators in preparing future practitioners and working toward reversing these trends.

There has been much attention paid to determining criteria for entering programs with little effect on attrition rates. Are we choosing the wrong students? Are students choosing to enter a profession for which they are not suited? What can educators do to help students make better choices or be more successful in their programs?

Helping students discover what job values are important to them and evaluating their self-reported abilities could help others predict who is at high risk for attrition. It may be useful to take steps to increase the awareness of students about what values and abilities are important in the practice of respiratory therapy. This could prevent them from entering a career that may not meet their expectations. Also, if students at high risk for attrition due to incongruent values and abilities were identified, intervention strategies could be initiated to help them be more successful.

When people are considering a career choice, they should be encouraged to clarify their job values; that is, what they are looking for in a job to bring about satisfaction (Harrington & O'Shea, 1993). The influence and predictive power of an individual's work values in making an occupational choice has been established in the literature by several investigators (Dawis & Lofquist, 1984; Pine & Innis, 1987; Zytowski, 1970).

The research suggests a strong relationship between individuals' work-specific values and their choice of occupation. Values have important consequences in the amount of satisfaction one may have in a career. Super (1970) wrote that values are objectives sought to satisfy a need and that occupational choice is an attempt to maximize need satisfaction through value realization. Dawis and Lofquist (1984) suggest that values are "standards of importance" for individuals and that they influence choice of work environment and the level of satisfaction one has with an occupational choice.

The characteristics, abilities, traits, and attributes that would be needed by future respiratory care practitioners were described in a Delphi study by O'Daniel et al. (1992).

According to the panel of experts, future practitioners will continue to need broad-based knowledge in the sciences and technological skills related to delivering respiratory therapy, as would be expected. Among the other abilities identified were communication skills, patient education skills (teaching), mathematics and reading skills, organization and time management skills, critical thinking skills, and many attributes associated with the affective domain. Many of these characteristics, traits, and attributes were confirmed by the First National Consensus Conference on Respiratory Care Education in 1992 (Cullen et al., 1993).

Abilities are those talents judged important in making a career choice and are considered a primary factor in job performance (Harrington, 1982). In respiratory therapy, a variety of ways have been used to assess abilities of students prior to entering programs, such as high school grade reports, Scholastic Aptitude Test scores, and science cumulative averages. However, this grouping of abilities may be inadequate.

The purpose of this study was to develop a national profile of the values and abilities of respiratory therapy students and determine if differences occurred between the sexes, between different grade levels, or between community/technical college and university students. Two instruments were used: the Career Decision-Making System Revised (CDM-R) by Harrington and O'Shea (1993) and a research version of the Ability Explorer (AE) by Harrington and Harrington (1993).

This study addressed the following research questions:

1. What are the work values of respiratory therapy students, and are there significant differences among gender, grades, and types of institutions?
2. What are the self-reported abilities of respiratory therapy students, and are there significant differences among gender, grades, and types of institutions?
3. What is the average reading level of respiratory therapy students, and is there a significant difference among gender, grades, and types of institutions?
4. Do the self-rated four best abilities on the CDM-R match student self-efficacy behavior statements on the AE?

Methods

One hundred respiratory therapy students from six states (California, Massachusetts, Ohio, Missouri, Kansas, and South Carolina) were surveyed during the 1993-1994 academic year. Surveys were sent to program directors, who were asked to have students complete the CDM-R and the AE. The CDM-R takes about 30 minutes to complete; the AE takes approximately 45 minutes.

Participants included students from technician, associate degree therapist, and baccalaureate degree therapist programs. Ninety-three percent (N = 93) of the returned surveys were usable, consisting of 54% females (N = 50) and 46% males (N = 43); 52% (N = 48) of the returned surveys were from technician or associate degree programs at community/technical colleges, and 48% (N = 45) were from baccalaureate programs at universities.

The breakdown by grade was 27% freshmen (N = 25), 40% sophomores (N = 37), 2% juniors (N = 2), and 31% seniors (N = 29). Data from seven students were not usable

because they either did not complete both instruments or they did not complete demographic identification data on one of the surveys, disallowing inclusion in the statistical analysis.

Survey Instruments

Ability Explorer. Fifteen major abilities were identified in the psychological literature as relevant to work. The AE fills a void for practitioners to help individuals discover and determine their self-efficacies on all of the major work-related abilities and to explain the relevancy of their best abilities. The AE ensures that professionals evaluate people on the full range of abilities and also that people may discover potentials in areas not previously assessed because current ability tests only evaluate 6 of the 15 recognized abilities. The assumption is that persons seek out and learn skills to increase an ability once they recognize the importance of and the type of talents needed for certain educational and occupational goals.

Through self-reports of 10 micro skills per ability that job analysts identified for successful work performance, the AE evaluates an individual's various abilities using a 5-level rating scale for each skill. The range of AE scores is 0-40. Another objective is to compare self-assessments to determine whether individuals have participated in experiences and activities that reinforce their self-descriptors of varied abilities and to suggest ways a person can improve a specific ability.

The 15 aptitudes assessed with this instrument were *artistic, clerical, interpersonal, language, leadership, manual, musical/dramatic, numerical/mathematical, organizational, persuasive, reading, scientific, social, spatial,* and *technical/mechanical.* A person's two highest abilities combined with other abilities are used to suggest occupations that complement a person's best scores. The AE was one source of the ability profiles collected in this study.

Career Decision-Making System Revised. The CDM-R was developed as a comprehensive career planning system to aid counselors and people in the career decision-making process. The CDM-R assesses three dimensions in making a career choice—abilities, values, and interests—and relates them to occupational information. The system's framework and interest scales are theoretically based, with the interest scales relating to the Holland vocational development theory.

The CDM-R asks people to document their current career aspirations, what school subjects they like best, future plans, job values, and abilities. The information results in a personal profile with career clusters for an individual to explore, as suggested by the interest scores.

Work values and abilities were also assessed in this study using the CDM-R. The CDM-R asks people to choose from 14 work values the 4 they consider most important. They are not asked to rank the values in order. The authors based the list of values on examination of the literature (Harrington and O'Shea, 1993). The 14 CDM-R values are *creativity, good salary, high achievement, independence, job security, leadership, outdoor work, physical activity, prestige, risk, variety, work with hands, work with mind,* and *work with people.*

In the CDM-R abilities section, people are asked to estimate their strongest abilities by choosing from a list of 14. The list was compiled after a review of widely used aptitude tests and Department of Labor publications. The 14 abilities are *artistic, clerical, computational, language, leadership, manual, mathematical, mechanical, musical, persuasive, scientific, social, spatial,* and *teaching.*

Analysis

All data were analyzed using the software Statistical Package for the Social Sciences for Windows™ and using a probability of up to .10 as the criterion for determining statistical significance. Probabilities are reported for all variables.

Each CDM-R work value took on a value of one if it was among the four chosen by a respondent or a value of zero if it was not among the four chosen. Frequency counts and percents were calculated for all CDM-R work values. Chi-square analysis was done to determine whether sex, type of college, or year in college accounted for significant differences in the number of respondents who chose each work value.

Each CDM-R work ability also took on a value of one if it was among the four chosen by a respondent or a value of zero if it was not among the four chosen. Frequency counts and percents were calculated for all CDM-R work abilities. Chi-square analysis was done to determine whether sex, type of school, or year in school accounted for significant differences in the number of respondents who chose each work ability.

Mean AE scores were compared to each corresponding CDM-R work ability to see if the respondent had chosen it or not. Independent samples *t* tests were used to determine whether mean AE scores were significantly higher for those who chose the corresponding CDM-R work ability than for those who did not choose that ability.

Results

Research question 1 examined whether there were significant differences among the groups studied in self-reported work values of respiratory therapy students.

The top four work values reported in Table 1 are as follows: work with people (60%), that is, 60 percent of the sample selected work with people as one of their highest values; good salary (57%); job security (46%); and high achievement (35%). There was a significant difference between males choosing work with people (42%) less often than females (76%), and females choosing good salary (66%) more often than males (47%).

Table 1
Top Four CDM-R Work Values by Sex

CDM-R work value	Percent in top four: All students *N* = 93	Females *N* = 50	Males *N* = 43	Chi-square significance
Work with people	60%	76%	42%	.001
Good salary	57%	66%	47%	.058
Job security	46%	46%	47%	.961
High achievement	35%	32%	40%	.449
Prestige	33%	30%	37%	.462
Independence	26%	30%	21%	.319
Work with mind	25%	14%	37%	.010
Variety	20%	24%	16%	.357
Creativity	19%	22%	16%	.486
Leadership	13%	14%	12%	.734
Physical activity	11%	12%	9%	[a]
Risk	5%	0%	12%	[a]
Work with hands	4%	4%	5%	[a]
Outdoor work	1%	0%	2%	[a]

Note. CDM-R = Career Decision-Making System Revised; *N* = total number of sample.
[a]Chi-square assumptions do not hold, as more than 20% of the cells in this table have an expected value of less than 5.

The same values emerged when examined by type of institution in 2- versus 4-year colleges (see Table 2). However, job security and prestige, at 38%, tied for the fourth most important value of students in 4-year schools; work with people and job security, at 54%, tied for the second most important value of those in 2-year institutions.

In examining the other nine values, significant differences were noted; work with the mind was chosen by 37% of the males, 14% of the females, 15% of students at 2-year colleges, and 36% of students at 4-year colleges. First- and second-year students, reported in Table 2, showed significant differences compared with third- and fourth-year students regarding independence (19% versus 39%, respectively) and prestige (27% versus 45%, respectively).

Research question 2 examined whether significant differences exist in self-reported abilities among the groups studied.

Table 2
Top Four CDM-R Work Values by Level of Education

	Year in college				Type of college		
CDM-R work value	All students *N* = 93	Year 1 or 2 *N* = 62	Year 3 or 4 *N* = 31	Chi-square significance	2-year college *N* = 48	4-year college *N* = 45	Chi-square significance
Work with people	60%	60%	61%	.881	54%	67%	.218
Good salary	57%	55%	61%	.554	56%	58%	.882
Job security	46%	52%	36%	.141	54%	38%	.113
High achievement	35%	32%	42%	.358	31%	40%	.378
Prestige	33%	27%	45%	.087	29%	38%	.379
Independence	26%	19%	39%	.044	23%	29%	.511
Work with mind	25%	21%	32%	.234	15%	36%	.019
Variety	20%	18%	26%	.363	15%	27%	.149
Creativity	19%	19%	19%	.999	19%	20%	.879
Leadership	13%	7%	26%	[a]	8%	18%	.175
Physical activity	11%	15%	3%	[a]	19%	2%	[a]
Risk	5%	7%	3%	[a]	6%	4%	[a]
Work with hands	4%	3%	7%	[a]	4%	4%	[a]
Outdoor work	1%	2%	0%	[a]	2%	0%	[a]

Note. CDM-R = Career Decision-Making System Revised; *N* = total number of sample.
[a]Chi-square assumptions do not hold, as more than 20% of the cells in this table have an expected value of less than 5.

The top four CDM-R self-reported abilities for all respiratory therapy students, reported in Table 3, were as follows: social (60%), scientific (46%), teaching (42%), and manual (33%). There were differences among the top four abilities by gender: Females chose social (70%), teaching (48%), scientific (38%), and leadership (30%), while males chose scientific first (56%), followed by social (49%), manual (42%), and teaching and leadership (35%), which tied for the fourth ability.

Other differences in the top four abilities (see Table 4) were between 2-year college students (social [54%], teaching [40%], manual [37%], and mathematical [35%]) and 4-year college students (social [67%], scientific [60%], teaching [44%], and leadership [33%]).

Table 3

Top Four CDM-R Work Abilities by Sex

CDM-R work ability	Percent in top four: All students *N* = 93	Females *N* = 50	Males *N* = 43	Chi-square significance
Social	60%	70%	49%	.038
Scientific	46%	38%	56%	.085
Teaching	42%	48%	35%	.201
Manual	33%	26%	42%	.106
Leadership	32%	30%	35%	.615
Mathematical[a]	28%	24%	33%	.359
Persuasive	23%	26%	19%	.395
Mechanical	22%	14%	30%	.057
Clerical	17%	26%	7%	.015
Language	16%	20%	12%	.274
Artistic	14%	14%	14%	.995
Musical	13%	14%	12%	.733
Spatial	10%	12%	7%	[b]

Note. CDM-R = Career Decision-Making System Revised; *N* = total number of sample.
[a]Mathematical and computational work abilities were combined for purposes of this study.
[b]Chi-square assumptions do not hold, as more than 20% of the cells in this table have an expected value of less than 5.

There was a significant difference between males (49%) and females (70%) who chose social as one of their work abilities. There was also a difference between females (38%) and males (56%) and between students at 2-year colleges (33%) and those at 4-year colleges (60%) in those who chose scientific as one of their top four abilities. Mathematical ability was chosen more often by students at 2-year schools (35%) compared to students at 4-year schools (20%). There was a significant difference between males and females choosing mechanical ability (30% of males and 14% of females) and clerical ability (7% of males and 26% of females).

Table 4 shows that there was a difference in scientific ability of students in years 1 and 2 (37%) of the program compared to students in their last 2 years (65%) of the program; this was also true in the area of teaching (36% versus 55%, respectively). A significant difference in mathematical ability was reported by students in the first and second years (34%) compared with students in the third and fourth years (16%).

Research question 3 examined the average reading level of respiratory therapy students among different groups. The average reading level for all students was grade 10.6. There was not a significant difference between the sexes, between year levels, or between community college/technical college students and university students.

Table 4
Top Four CDM-R Work Abilities by Level of Education

		Year in college			Type of college		
CDM-R work ability	All students *N* = 93	Year 1 or 2 *N* = 62	Year 3 or 4 *N* = 31	Chi-square significance	2-year college *N* = 48	4-year college *N* = 45	Chi-square significance
Social	60%	58%	65%	.549	54%	67%	.218
Scientific	46%	37%	65%	.012	33%	60%	.010
Teaching	42%	36%	55%	.075	40%	44%	.635
Manual	33%	34%	32%	.876	37%	29%	.379
Leadership	32%	27%	42%	.159	31%	33%	.830
Mathematical[a]	28%	34%	16%	.072	35%	20%	.098
Persuasive	23%	27%	13%	.114	29%	16%	.117
Mechanical	22%	21%	23%	.858	21%	22%	.871
Clerical	17%	21%	10%	.174	21%	13%	.338
Language	16%	15%	19%	.550	15%	18%	.676
Artistic	14%	10%	23%	[b]	13%	16%	.671
Musical	13%	11%	16%	[b]	8%	18%	.175
Spatial	10%	8%	13%	[b]	4%	16%	[b]

Note. CDM-R = Career Decision-Making System Revised; *N* = total number of sample.
[a]Mathematical and computational work abilities were combined for purposes of this study.
[b]Chi-square assumptions do not hold, as more than 20% of the cells in this table have an expected value of less than 5.

Research question 4 studied whether those who chose abilities on the CDM-R system as their best scores had significantly different scores for those abilities on the AE.

The mean and standard deviation for the AE with corresponding CDM-R ability self-reports are shown in Table 5. The match between the two instruments varied with ability. There was a significant correlation between AE mean scores and whether a person chose or did not choose that ability on the CDM-R for the following abilities: social, scientific, teaching, manual, mathematical, mechanical, artistic, and musical. This offers support that some who state their best abilities are basing their judgment on their self-efficacy beliefs in performing related behaviors. Unanswered is which is more valid, for example, those individuals who on many different tasks stated they are very proficient in convincing people or those who appear to deny it when they fail to choose persuasive as one of their best abilities.

Table 5

AE Scores with Corresponding CDM-R Work Abilities, Dependent on Whether a Person Did or Did Not Choose That Ability as One of Their Top Four Abilities

	AE score			
CDM-R work ability	All students Mean (*SD*)	CDM-R chosen[a] Mean (*SD*)	CDM-R not chosen Mean (*SD*)	*t* test significance
Social	31.0 (4.7)	32.3 (4.8)	29.1 (3.9)	.001
Scientific	27.7 (5.8)	31.3 (4.7)	24.6 (4.7)	.000
Teaching[b]	37.1 (5.8)	38.7 (4.7)	35.9 (6.3)	.021
Manual	30.5 (5.5)	33.1 (5.0)	29.2 (5.3)	.001
Leadership	29.5 (4.8)	30.0 (4.7)	28.1 (5.3)	.150
Mathematical[c]	27.3 (7.2)	31.5 (6.0)	25.7 (7.0)	.000
Persuasive	28.6 (5.2)	30.0 (4.7)	28.1 (5.3)	.150
Mechanical[d]	20.3 (8.7)	25.6 (8.2)	18.8 (8.4)	.002
Clerical	30.1 (5.9)	31.7 (6.3)	29.8 (5.8)	.234
Language	26.3 (5.0)	26.8 (3.7)	26.2 (5.3)	.618
Artistic	22.7 (5.9)	27.5 (6.3)	21.9 (5.5)	.001
Musical	21.4 (7.2)	28.8 (7.0)	20.3 (6.5)	.000
Spatial	29.1 (8.7)	29.6 (6.6)	29.0 (5.3)	.785

Note. AE = Ability Explorer; CDM-R = Career Decision-Making System Revised; *SD* = standard deviation.

[a]Number of students varies as reported in descending order in Tables 3 and 4.

[b]AE's *interpersonal* was matched with CDM-R's *teaching*.

[c]Mathematical and computational work abilities were combined for purposes of this study.

[d]AE's *technical* was matched with CDM-R's *mechanical*.

Discussion

There is evidence in this study that people attracted to the respiratory therapy profession have a need to interact with people and consider their social abilities to be high. This may explain the findings by others who reported that satisfaction with supervision was one of the significant variables affecting job satisfaction (Akroyd & Robertson, 1989; Plunkett & Polli, 1986; Rawlins, 1987).

In addition, Shelledy et al. (1992) found that among the job-related predictors of burnout was co-worker support and satisfaction with co-workers. These studies indicate how important the work environment needs to be regarding good interpersonal relationships for respiratory therapists. This is not surprising since respiratory therapy students ranked work with people as their number one value and social as their number one ability. This would point to the need to ensure that supervisors and clinical

instructors have appropriate training and are as good with people as they are with their technical skills.

In addition, attention needs to be given to developing the team building and communication skills in respiratory therapy programs to ensure competence in these important areas.

Perhaps the future needs of the profession as described in the Delphi study (O'Daniel et al., l992) and at the First National Consensus Conference on Respiratory Care Education (Cullen et al., 1993) will give professionals more opportunities to use their social and teaching skills. For example, the continued expansion in the area of home care will require competent teaching and communication skills as practitioners work in the area of patient and family education. Perhaps the fourth most important value reported in this study—high achievement—is more likely to be met in the future and result in a higher level of practitioner satisfaction.

On the other hand, perhaps the profession has to look closely at those leaving the field and consider whether respiratory therapy might actually be an entry-level career, especially for 4-year graduates. Some people seem to see limitations and outgrow the clinical practice aspects of the field sooner than other health care fields. Respiratory therapy is a profession most attractive to people with high needs to work with others. However, the high level of technological skills required to be successful cannot be overlooked. As technology continues to advance, we may in fact lose more practitioners if expanded opportunities to use the "people skills" of the profession are not created.

Working with people appears to be even more important to females compared to males. In contrast, males and 4-year students put a higher value on working with the mind than females and 2-year students. This does not mean that females and 2-year students do not want to be challenged in critical and abstract thinking, but their priorities are different in some ways. These results indicate that perhaps 2- versus 4-year students and males versus females may have different needs to fulfill in the work environment when they graduate.

It is not surprising that males chose mechanical more often as an ability compared to females and that the opposite was true regarding clerical. These responses appear to be gender typical. This may relate, in part, to their past work experiences in these areas.

Prestige and independence increase significantly as students go through a 4-year curriculum. Both of these values may relate to the amount of clinical experience emerging as the students progress through the curriculum. Independence becomes more important as they gain confidence in clinical abilities. Valuing prestige may come as they develop their place on the health care team.

One of the expected goals of most baccalaureate programs is to prepare graduates who will provide leadership in clinical practice, education, and research. Although leadership does emerge as an ability, the result is not as high as baccalaureate educators might have anticipated. Attention to leadership development is especially significant in view of the study reported by Shelledy, Youtsey, et al. (1992) indicating that baccalaureate graduates are the most likely to leave the profession.

Educators should be asking if the leadership goals of the profession are being relayed to students and if the curriculum is designed to improve skills and self-efficacy in this important area. If not, steps need to be taken to help students see their potential as leaders.

Respiratory therapy (RT) requires an ability to learn science. Considering that it is not possible to be successful in any RT program without the ability to understand and apply scientific concepts, it is disturbing to note that only 46% of all students chose scientific as one of their top four abilities. Community college students chose it less often than 4-year students, and females chose it less often than males.

Scientific ability does appear to develop as 4-year students progress in their programs (37% to 65%). However, the fact that less than half of the freshmen and sophomores believed that science was one of their top four abilities can be a significant problem for students. Whether this self-evaluation is justified or not may be irrelevant. Students who are not confident in their scientific ability are likely to be unsuccessful early in the program.

The research suggests that self-estimates are good predictors of achievement and are often more efficient than standardized aptitude tests (Baird, 1969; Biggs & Tinsley, 1970; Harrington & O'Shea, 1993; Keefer, 1969). Self-estimates do not constitute ability or aptitude, but they are an expression of a person's self-perception, and people tend to behave in a manner consistent with their image of themselves (Baird, 1971).

For example, Baird (1969), an Educational Testing Service researcher studying 5,129 freshmen at 29 colleges, found that self-ratings of scholastic ability were the best predictors of grade point average (GPA). Keefer (1969) reported that for 154 undergraduates, self-predicted GPA was a better predictor of actual GPA than either an American College Test composite score or high school GPA.

Attrition data indicate that our assessment tools for admission are inadequate or efforts in our programs to prevent failure are inadequate. The most common reason for attrition is poor academic performance; however, when we admit students, we believe they are academically capable. What goes wrong between acceptance and graduation? The emphasis in the past seems to have been on finding the right formula for admissions, with less attention paid to efforts made toward retention.

What can educators do to ensure a higher rate of success for respiratory therapy students? Institutions need to look at teaching strategies and determine if the various learning styles of students are being met. Most programs rely on faculty outside the programs for service courses. Alliances need to be developed between program faculty and basic science faculty to ensure the highest quality of teaching. Making use of a variety of technologies and strategies such as computer-assisted instruction, cooperative learning, and team problem-solving could help faculty become more-effective instructors and help students become more successful academically.

Students may be at a disadvantage in several ways that contribute to program attrition rates. The average reading level of our students was only grade 10.6, and yet the respiratory therapy and physiology texts are written at a much higher grade level of at least grade 14 and in many cases as high as grade 17 (Watson & Low, 1988; Watson & Scully, 1988). This problem adds to the need to ensure that teaching strategies are designed to meet the needs of a variety of learning styles and reading abilities.

Respiratory therapy educators need to take steps to ensure students with the ability to be successful in the program have opportunities to build their self-confidence. Lent and Hackett (1987) have published a review of self-efficacy research dealing with careers.

Studies on self-efficacy have shown that beliefs about one's performance are varied for different areas. This focus on self-efficacy could help to reverse the high attrition rates due to poor academic performance.

Self-efficacy beyond the classroom seems important for all students and may be even more critical for community/technical college and female students. Students may be more successful if advisors and instructors work collaboratively with them to ensure their needs are considered and to help them improve their self-confidence. Evaluating the self-perceived abilities, learning styles, and reading abilities at the beginning of the program may help determine individual and class needs.

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Revision Pedagogy in the Technical Writing of Respiratory Care Students

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Abstract

The purpose of this study was to determine if peer-instructor conferences improved the quality of respiratory care student papers. Students exchanged drafts with one another and their instructor. Students were instructed to read each other's work and mark brief comments directly on the student's draft for any surface errors and any content areas that needed clarification. Papers were evaluated qualitatively and reported in a case study format. Some students never moved beyond surface level corrections. Those students who moved beyond surface level revision made changes by focusing on organization, adding or deleting information, and improving language usage. Peer-instructor revision sessions prove beneficial even if students only make surface level changes.

Revision Pedagogy in the Technical Writing of Respiratory Care Students

> I don't write easily or rapidly. My first draft usually has only a few elements worth keeping. I have to find what those are and build from them and throw out what doesn't work or what simply is not alive. (Sontag Sontag as cited in Winokur, 1990, p. 244)

Many universities and colleges encourage their faculty to incorporate into their courses some means to engage students in writing. Indeed, some schools mandate writing across the curriculum. A broad goal from a college catalogue may read: "Students are expected to communicate effectively using standard English."

In the University of Kentucky Community College System, the senate-rules direct faculty to call attention to and penalize students for errors in English usage. Furthermore, papers that do not meet acceptable standards are expected to be rewritten. Faculty who have taken few English courses often feel uncomfortable when called upon to assess their students' writing. This feeling is exaggerated when they are required to return papers that do not meet acceptable standards. However, faculty will often mark papers with red ink with the same thoroughness used in preparing a highly technical lecture.

Still, faculty complain that students do not know how to write and wonder how the students successfully completed freshman English, particularly when students do not seem to care enough to edit or proofread their papers. Nevertheless, the problem goes much deeper than mere proofreading and editing. The heart of the problem is that many of our students have no concept of revision. In 1986 at the Conference of Language and Literacy, Balajthy (1986) said, "The revision stage is the keystone of the writing process. Without an appropriate student attitude toward revision, the writing process collapses" (p. 2).

Revision means many things to different people. Revision may mean (a) improving the appearance or legibility of one's writing; (b) making mechanical changes; (c) correcting for spelling, punctuation, and capitalization errors; (d) adding information, deleting information, or both; (e) clarifying transitions; and (f) rearranging or reorganizing the elements contained in the writing to increase understanding (Education Commission of the States, 1977).

The ability to write is important. If our students want to advance professionally, they must possess excellent communication skills. Furthermore, the ability to revise is important. Rewriting skills are the essence of good writing. A good writer moves from ambiguity to clarity (Education Commission of the States, 1977).

The ultimate purpose of revision is to clarify an idea, not to correct surface changes. Unfortunately, students generally spend most of their time on surface level changes. However, we should blame the educational process, not the student. Students are taught from the beginning of the primary grades through college composition courses to correct punctuation, usage, vocabulary, and spelling, and rightly so, but they are not instructed to make changes in content (Bioarsky, 1981).

Students have been conditioned throughout the years to believe that a proofread version of their draft can serve as their final draft (Lehr, 1987). When we ask students to revise, too many of our students do little more than proofread, edit, and recopy their

original draft. As inexperienced writers, they view revision as editing and proofreading (Lehr, 1987; Smith, 1982). In other words, they hang onto their words and poorly written sentences with the tenacity of a pitbull.

Inexperienced writers will have difficulty developing their writing skills if they are concerned only with making surface level changes (Lehr, 1987). So how do we as teachers get our students to revise? One method is peer-instructor conferences. Studies support the concept of peer-instructor conferencing. Balajthy (1986) maintains that peer-instructor conferencing encourages a proper attitude toward revision. A careful review of the literature revealed no similar studies have been done to date in allied health or respiratory care.

When enrolled in Respiratory Care Seminar (RES 225), students in the respiratory care program at Madisonville Community College in Louisville, Kentucky, must prepare a research paper. In the paper reported here, I sought to determine if the revision strategy of peer-instructor conferences would engage students in the revision process. In essence, I sought to determine if peer-instructor conferences would reduce the number of surface errors, increase the clarity of the students' writing, and thus improve the overall quality of the papers submitted by my respiratory care students.

Methodology

I incorporated a revision session into the normal sequencing of the syllabus. I followed the strategies suggested by Smith (1982), Denn (1982), and Polanski (1985). Each session lasted as long as a typical class session—2 hours. Students were instructed to carefully read each other's work and make brief but appropriate comments as to any mechanical, spelling, or grammatical errors they discovered.

In addition, I instructed the students to write brief comments as to the content of the students' writing and any areas that needed clarification. The students and the instructor wrote their comments directly on the student's draft. As soon as one finished reading and marking written responses on a draft, he or she exchanged the draft with one who had just finished doing the same. The session continued until everyone had a chance to respond to every paper.

The purpose of having students and the instructor respond to a rough draft was to provide feedback from a real audience. The student then had the opportunity to make the suggested changes before submitting a final paper for a grade.

The research papers, actually proposals, followed the approach suggested by Babbs and Tacker (1985). The jest of what they advise is for the would-be-researcher to write the paper as if the research activity actually occurred. My students did not actually do the research, but they did write papers as if they actually did the research. In addition, the students followed the manuscript-preparation instructions provided by *RESPIRATORY CARE* Journal.

The research papers included some of the following topics: metered-dose inhalers versus hand-held nebulizers, the correlation between capnography and $PaCO_2$, and the use of nitric oxide in adult respiratory distress syndrome. Paper length varied from 6 to 12 pages.

Results

I evaluated the research papers qualitatively. I examined papers for appearance, mechanics, spelling, punctuation, capitalization, information, clarification of transitions, and the rearranging or reorganizing of text to increase understanding. Due to the qualitative nature of this study, I decided to report my results in a case study format.

In addition, I created fictitious initials to protect the identity of each student. Furthermore, when directly quoting from student papers, I made no attempt to correct for errors in either the first draft or the final draft. Lastly, I have summarized the results of my case studies in Table 1, classifying my students as revisers or nonrevisers.

Table 1
Student-Classification Case Study Results

Revisers[a]	Nonrevisers
1. A.B.	
2. C.D.	
3. E.F.	
4. G.H.	
5. I.J.	
6. L.M.	
7.	N.P.
8. P.R.	
9. R.S.	

[a]Includes those who edited, made surface changes, and revised extensively.

Case Study I: A.B.

In the first draft, A.B. wrote, "Metered-dose inhalers can deliver medication in about half the time of a hand held [*sic*] nebulizer." A.B. was directed to cite a reference by the instructor, and a student asked for more substance. A peer wrote in the margins, "So and so demonstrated such and such with MDIs vs. HHNs." AB's revision read as follows:

> Metered-dose inhalers can deliver medication in about half the time of a hand-held nebulizer. According to the study by McDernall et al., "Patients in the MDI group got their medication more quickly. ED personnel assembled the MDI and reservoir and showed the patient how to use the device in less than three minutes. Administration of the full albuterol dose took another three minutes. In contrast, 11-15 minutes elapsed while the nebulizer was assembled and the first dose administered: subsequent treatments took 10-14 minutes."

In response to the instructor's question—"What statistical tests did you use?"—A.B. responded by adding a two-tailed *t* test to the final paper.

A.B. also made revisions only when directed to do so by peers. For example, A.B. described the original patient in these words: "Three had history of COPD and three with [*sic*] asthma." A.B. was asked to limit her patient population. In the revised paper, A.B. confined the entire patient population to asthma.

However, A.B. did not respond to all suggestions. A.B. never expanded the discussion section, even though the instructor suggested this. Nor did A.B. address a question raised by a student and instructor to state the study question.

A.B. revised by adding information, but the revisions were not extensive.

Case Study II: C.D.

C.D. wrote, "Capnography, the non-invasive measuring tool, used mainly by anesthetists for monitoring end-tidal carbon dioxide ($EtCO_2$) in the mechanically ventilated patient, is a great tool for quick and accurate CO_2 elimination or build-up." In the revision session, a student circled "a great tool," and the instructor asked, "Does it actually eliminate CO_2?" In the final version, C.D. wrote the following:

> Capnometry is a non-invasive monitoring device that is used mostly by anesthesiologists in the operating room for the prediction of Carbon Dioxide (CO_2) buildup and elimination in the mechanically ventilated patient, and is a great device for estimating Arterial Carbon Dioxide Tension ($PaCO_2$).

Although C.D. did respond to the peer and instructor, I do not believe he responded satisfactorily.

C.D. also wrote, "A simulated study was performed to evaluate the usefulness of the (Nelcor) [*sic*] $EtCO_2$ monitor in twenty post-op mechanically ventilated patients, ages > 20 + < 50." A peer asked, "Is this right?" In addition, C.D. reworked the "Methods" section. The final version read as follows:

> A non-invasive capnometer will be compared to an Arterial Blood Gas monitor in the usefulness, dependability, and the accuracy of two monitors. We will evaluate eleven post-operative patients with a variety of diagnoses on the basis of weaning techniques used to discontinue mechanical ventilation.

In the "Results" section, C.D. wrote, "Weaning after < 12 hours on a mechanical ventilator showed great results in the control group. Group I had no occurrance [*sic*] in hematomas, hypocapnea, hypercapnea, desaturation and tissue destruction that would have occurred with ABGs." In the revision session, a peer underlined "great results." C.D. reworked the sentence and came up with the following: "We predict that $EtCO_2$ will be significantly higher with spontaneous breaths (35.1 +/- 2. 4 torr) that [*sic*] with SIMV breaths (31.2 +/- 2.4 torr) (P less than 0.001)."

C.D. also made changes in the final paper without being directed to do so. C.D. corrected the following surface error. In the original draft, *extra-corporeal* was misspelled as *extra-corpreal.* CD also wrote, "This research was designed to compare regular arterial blood gas (ABG) analysis to a non-invasive $EtCO_2$ monitor for the reliable, safe, non-truma [*sic*] producing, and time saving protocol for weaning the mechanically ventilated patient." C.D.'s revised version read, "This research will be done to compare

regular ABG analysis to a non-invasive $EtCO_2$ monitor for the reliable, safe, and time saving protocol for monitoring the critical ill patient."

C.D. revised by correcting surface errors, deleting information, and adding information. Although not letter perfect, C.D.'s revised version was an improvement over the first draft.

Case Study III: E.F.

E.F. made very few changes after the revision session. In the first draft, E.F. wrote, "One thing for certain we do know the importance of Ribavirin itself. It is used to treat RSV (Resp. Syncytial Virus) infection which is the number one case of infant bronchiolitis. And its necessity is not in doubt." E.F. reworked the previous sentences into the following: "One thing for certain, we do know the importance of Ribavirin itself. It is used to treat RSV (Respiratory Syncytial Virus) infections, which is the number one cause of infant bronchiolitis, and its necessity is not in doubt." In the peer-instructor revision session, E.F. was directed to support some undocumented statements with references. E.F. initiated all the other changes and corrections.

E.F. revised, but primarily at the surface level.

Case Study IV: G.H.

G.H. made substantial and extensive changes in the research paper after the revision session. In fact, G.H. went through two drafts before turning a paper in for a final grade. A student commented, "G.H.'s first draft reads like a report even though formatted according to *RESPIRATORY CARE* manuscript guidelines." For this paper, G.H.'s second draft will be the starting point when quoting any changes that she made. G.H. also did not have the opportunity of a second revision session; G.H. sought out instructor and peer comments outside of class time.

In the second draft G.H. wrote, "Nonetheless, to determine the benefits of pulmonary rehabilitation certain outcomes must be measurable. A patients [*sic*] perception of dyspnea is one indices that is measurable."

In reading the second draft, the following comments were written on the paper: "You might want to document this!" and "Dyspnea can be measured via analog scale Borg (0-10) range!" In addition, *indices* was underlined. G.H. wrote the following in the final paper:

> Nonetheless, to determine the benefits of pulmonary rehabilitation certain outcomes must be measurable. A patients [*sic*] perception of dyspnea is one indices that can be measurable two different ways. First, with a visual analogue scale (Borg) during a graded treadmill exercise testing to look at exertional dyspnea. Secondly, with baseline transitional dyspnea indices to examine overall dyspnea.

In the second draft, G.H. also wrote, "A study was set up to indicate that patients who receive rehabilitation will increase activities of daily living, decrease dyspnea, decrease hospitalizations, and decrease morbidity and mortality rates." Prompted by the remark, "I assume these are your outcome variables," G.H. made the following changes:

> Therefore, we set up a study to indicate whether patients who receive rehabilitation will increase their activities of daily living, and/or any benefits occur [*sic*] in the following variables; [*sic*] dyspnea index, maximum heart rate, oxygen saturation, and minute ventilation, and oxygen consumption parameters.

G.H. not only revised, but made substantial and extensive changes. Moreover, G.H. willingly removed superfluous text from the second draft.

Case Study V: I.J.

I.J. made only surface changes; in the first draft, I.J. wrote the following:

> The Adult Respiratory Distress Syndrome (ARDS), [*sic*] is actually a grouping of several disorders that bring about critical changes in the lung. These changes manifest themselves mainly with pulmonary hypertension and right to left shunting. These manifestations are in large part brought about [*sic*] the diffuse damage to the alveolar capillary membrane.

In the final paper, I.J. wrote:

> The Adult Respiratory Distress Syndrome (ARDS) is actually a grouping of several disorders that bring about critical changes in the lung. These changes manifest themselves mainly with pulmonary hypertension and right to left shunting. These manifestations are in large part brought about by the diffuse damage to the alveolar capillary membrane.

Case Study VI: L.M.

L.M. made a few changes in response to the peer-instructor revision session. L.M.'s first draft did not contain an abstract. A student marked "Abstract!" on the first draft. This apparently prompted L.M. to write an abstract. However, L.M. may have written one independent of the student's comment.

Also in the first draft, L.M. wrote, "The research contained in this study concentrated on positive pressure ventilation via a mask." A student asked L.M. to insert *nasal* before *mask.* The new sentence read in the final paper, "This study was conducted on nasal mask ventilation because there is a need for alternative methods of mechanical ventilation in order to increase comfort, decrease the possibility of infection, and decrease the duration of mechanical ventlation."

L.M.'s first draft was essentially a completed paper. L.M. made the comment, "Once I've written it down, I usually don't change it!"

Case Study VII: N.P.

N.P. did not make any changes to the research paper after the review session.

Case Study VIII: P.R.

In the first draft, P.R. wrote the following: "It was stated physicians are feeling heightened economic pressure to move ventilator-dependent patients to lower levels of care." During the peer-instructor review session, a student marked the draft with "Move statement to the beginning line." P.R. moved the sentence to the introduction.

P.R. also made some surface changes. In the first draft, P.R. wrote the following: "The restiance [*sic*] of the endotracheal tube and the ventilator circuit can contribute to the

inspiratory work of breathing, therefore prolonging weaning." The revised version read, "The resistance of the endotracheal tube and the ventilator circuit can contribute to the inspiratory work of breathing, therefore, prolonging weaning."

P.R.'s revisions were primarily at the surface level.

Case Study IX: R.S.

R.S. removed the following from the introduction in the first draft:

> However, patients today often improperly use meter [*sic*] dose inhalers. The young and elderly have trouble coordinating actuation and inhalation. Various spacing devices have been developed to hold or slow down the aerosol from the MDI so that patient [*sic*] can more readily inhale the aerosol without coordination.

R.S. was not prompted to do so during the peer-instructor revision session. R.S. also did not make any extensive revisions.

Discussion

When one sits down to write, whether with pen or at a keyboard, the writer moves in and out of the writing process, making a change here and making a change there. This change in organization often signals a need for a transition that triggers a change in syntactic structures, not only in the particular sentence affected, but also in the following one (Bioarsky, 1981). Perhaps this explains why some students in my study apparently did very little revising.

Some students revised extensively during the writing process as they moved through the first draft. These students appear to be more successful than others at revising text as they write. For these students, revision is truly recursive.

Some students never moved beyond surface level corrections, but a few did. Those who revised at the surface essentially engaged in editing. Beach (1982) identifies these students as nonrevisers. Those students who moved beyond surface level revision made substantial changes by focusing on tone and organization, adding and deleting information, creating smooth transitions, emphasizing and subordinating ideas, and improving syntactic structures and language usage. Beach refers to these individuals as revisers. However, I decided to classify even those students who corrected for surface errors as revisers, not to skew my results, but because RES 225 is not a writing class per se; I wanted to show that even the activity of peer-instructor conferences could create the environment for these low-level changes.

Is there a significant difference between experienced and nonexperienced writers in their approach to revision? Polanski (1985) seems to think so. He writes,

> [Researchers] have shown the differences between the revisions of… experienced and inexperienced writers to be one of attitude toward writing and revision. [Researchers] have found that while some experienced writers planned very carefully before writing and did not have to do much rewriting, most used their first drafts as a means of discovering what they really wanted to say. Inexperienced writers viewed their final drafts as finished products and made mechanical changes which did not involve changes in meaning." (p. 97)

The students in my study essentially had the same amount of writing experience; they all had completed, or were in the process of completing, freshman English. With the exception of one, all my students made mechanical corrections to their papers. Only two of my students made any significant change in content and form. The writing experience level of these two does not explain why they engaged in extensive revision. The majority of my students simply edited the first draft, calling this activity "revision."

To avoid the editing-as-revision trap, teachers as well as students must distinguish between revision and editing. Editing is designed to create a perfect version of the paper by correcting for spelling, grammar, usage, and punctuation errors. Balajthy (1986) believes these mechanical operations are best handled after the student addresses content and form.

In order for writing to succeed, the writer must write for a well-defined audience. Beach (1982) maintains that when writers assess their drafts from the audience's point of view, they can decide whether or not their drafts are appropriate or effective. Students must move beyond the teacher as the only reader in the audience and write for a broader community. In the case of respiratory care students assigned a research paper, the broader audience is the community of respiratory care practitioners.

Writers also need to consider the reading skills of their audience in order to make decisions about vocabulary, syntax, transitions, and logical structures of what they are writing (Beach, 1982). Bioarsky (1981) also believes a valid model for analyzing revision needs to consider such aspects as a writer's knowledge of the subject and the audience, and familiarity with the style.

I instructed my students to write for respiratory care practitioners. My students had previous exposure to journal articles from *RESPIRATORY CARE*. We reviewed articles and abstracts weekly. Yet some had difficulty wading through very dense technical journals when reviewing the literature for their paper.

One can argue that the audience's reading ability is not necessarily a pragmatic concern for the writer, but readers and students may judge a writer's status, skills, or information negatively if the writer fails to realize that his or her audience is not familiar with the technical jargon, particularly statistical procedures. Unfortunately, the readers may infer the writer is insensitive to their needs (Beach, 1982). Perhaps this explains why some of my students had varying levels of difficulty with the different sections of their research paper. One failed to mention the statistical procedure he would have used to analyze his data.

Marder (1982) writes to those attempting to write technical text. He says, "In utilitarian prose… the meaning is stated, whether inductively or deductively or both, and the burden of composition is substantiating or reinforcing or rendering that meaning" (p. 6). Unfortunately, Marder is singularly unhelpful and serves as an example of those insensitive to their audience's needs.

Another aspect of successful revision is ownership. Students need to own their subjects if they are to maintain any sustained engagement in the revision process (Huff, 1983). I did this by having students select their own research topics, even though it went against the grain of their grumbling.

The primary focus of this study was to determine the effects of peer-instructor revision

sessions on the research papers of respiratory care students. The effects of peer-instructor conferences had positive results. All but one student engaged in surface corrections. Most of the students moved information from one section to another. Two students engaged in extensive revision.

In order for peer-instructor conferences to succeed, a teacher must direct his or her students in the types of questions to ask and comments to make in response to student writing (Balajthy, 1986). I believe the students responded equally to instructor and student comments. Lehr (1987) maintains that direct teacher intervention produces positive results. I would like to add that direct student intervention *seems* to produce positive results.

I also discovered that concise comments direct students' writing. Raymond (1989) believes that tactfully worded diagnostic comments on the initial draft can direct students through revision by helping them think about the reader. Hillocks (1982) demonstrated that the overall mean gain for brief comment papers was the same as that for extensive comment papers. In fact, in some instances, short comments appear to be about twice as effective as long comments.

Peer-instructor revision sessions seem to support what Huff (1983) calls "problem-solving drafting." Huff writes at length on the benefits of problem-solving drafting. He states,

> The power of problem-solving drafting derives from the fact that it addressed the problems that the writers themselves have created in their zero drafts. The resolution of specific problems tends to have global effects, forcing the writer to rework the overall structure of the evolving text in increasingly sophisticated terms. It is at this point in the drafting process that the writer can begin to take charge of the text—adding, deleting, substituting, and reordering major components in accordance with an increasingly realized and interconnected set of rhetorical goals. (p. 81)

Perhaps the global effects of the revision session explain why some students made changes in their first draft without any prompting to do so. For some reason, the revision session served as an impetus to make further changes. The students were able to step into the role of an objective diagnostician and make the necessary changes.

Roundy (1984) offers some useful advice for encouraging effective revision: Hold revision sessions, utilize peer review, and prepare a revision checklist. The use of a revision checklist may have directed my students to create a more polished product. Other limitations to this study include but are not limited to the following: (a) Students had little exposure to peer-instructor revision sessions; (b) student names were not removed from the papers, perhaps creating bias; and (c) students may have found integrating a literature search with a research proposal daunting.

Conclusions

In conclusion, peer-instructor revision sessions proved helpful even if the students only made surface level changes to their papers. For some students, the revision session may have had global effects, causing extensive and substantial changes to their papers. I suggest

conducting peer-instructor revision session for students who have limited experience in writing, particularly technical writing.

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Review of the Literature for Cross-Training and Job Redesign for Respiratory Care Personnel in Florida Acute Care Hospitals

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Abstract

Health care provision in the United States and Florida is a costly and labor-intensive industry. The issues surrounding respiratory care personnel preparation for multicompetent practice in Florida acute care hospitals include health care personnel regulation, health care costs, and educational curriculum development. Florida has been active in cross-training for multicompetent practice. Competencies in nursing, cardiopulmonary, clinical laboratory, and radiological technology are identified for cross-training of respiratory care personnel. Job redesign factors of work characteristics, education and training, satisfaction, and incentives are examined as components of restructuring the work environment. Results may be applicable for developing a curriculum model for the cross-training of respiratory care personnel as part of hospital job redesign.

Review of the Literature for Cross-Training and Job Redesign for Respiratory Care Personnel in Florida Acute Care Hospitals

Health care in the United States and Florida has been a costly and labor-intensive industry, with hospital labor costs comprising over 55% of total expenditures. Health care reform has brought pressure to control costs, including personnel costs, and to improve the delivery of services by cross-training health care professionals to perform a broader range of duties.

Respiratory care professionals have been identified for cross-training and multicompetent practice. This has necessitated education and training in competencies normally outside the respiratory care scope of practice. Literature has discussed restructuring the work culture, or job redesign, to make multicompetent practice successful.

The literature search for this review was intended to identify related literature and research pertinent to (a) the development of multicompetent practice as an increasingly significant issue within health care reform throughout the United States and Florida, (b) the rationale for cross-training respiratory care professionals for multicompetent practice, (c) the competencies appropriate for cross-training respiratory care professionals in Florida acute care hospitals, and (d) the job redesign factors suitable for multicompetent practice within the restructured health care service delivery system. Results may be applicable for development of a curriculum model for cross-training of respiratory care personnel as part of hospital job redesign.

Section I

Multicompetent Practice

Multicompetent health practitioners are those who can perform functions extraordinary to the expectations of their discipline. The multiskilled health practitioner has been defined as a person cross-trained to provide more than one function, often in more than one discipline. These combined functions can be found in a broad range of health-related jobs ranging in complexity from the nonprofessional to the professional level, including both clinical and management functions.

The additional functions (skills) added to the original health worker's job may be of a higher, lower, or parallel level (Bamberg, Blayney, Vaughn, & Wilson, 1989). The terms *multiskilled, multicompetent,* and *cross-trained* have often been used synonymously and interchangeably and are all considered the opposite of *specialist* (Blayney, 1992).

Blayney's (1992) book, *Healing Hands: Customizing Your Health Team for Institutional Survival,* has served as a major resource for multiskilled practice development and restructuring of hospital service delivery. This resource has promoted a more productive workforce through exploration of linkages between disciplines, fields of study, and the employers of health care workers.

The current health care system has often utilized the most expensive provider for tasks that could be accomplished by others at a lower cost without endangering the quality of

care. This state of affairs has not necessarily been in the best interest of a public facing rapidly increasing health care costs (Blayney, 1992).

Improving both cost and service performance has most frequently been accomplished by looking at how employees are used. Due to personnel-related costs accounting for 50 to 60% of total costs, even a modest improvement could dwarf much larger percentage improvements in any other cost category (Lathrop, 1993).

The origins of the multiskilled health practitioner movement in the United States can be traced to the 1950s as individuals in health care explored creative solutions to meet the health needs of people in rural areas. Lacking a large population base, these areas often could not financially support health care practitioners with narrow specialties. One solution was that a nurse, the multiskilled practitioner, could function in fields as diverse as clinical laboratory sciences, radiology, medical assisting, and what was then called "inhalation therapy." Ironically, the proposed solution did not achieve its original purpose because the multiskilled practitioners, usually educated in the city, often did not return to the rural area to practice (Blayney, 1992).

Changes in the types and characteristics of health manpower in the 20th century have been dramatic and pertinent in considering multicompetent practice development. The health professions requiring a college education or professional participation have increased from 200,000 persons in 1900 to 4.9 million in 1990. During that same time, the proportion of physicians declined from three of every five health workers to about one out of every eight health care workers (Blayney, 1992). By 1993, the total number of health care workers had grown to 10 million in the United States (O'Neil, Shugars, & Bader, 1993).

In addition to the overall increase in manpower, new health care manpower specialties emerged. These specicialties included physician assistants, nurse practitioners, multiskilled health practitioners, laboratory technicians, occupational and physical therapists, medical records personnel, respiratory therapists, and radiological technologists (Blayney, 1992). Lathrop (1993) has reported that within the typical 500-bed hospital, compartmentalization has resulted in 350 different job classifications and further specialization of workers.

The primary reasons for the increased supply and variety of health care personnel in the 20th century are (a) the interrelated forces of escalating technological change, (b) increased specialization of the workforce, and (c) the emergence of the acute care hospital as the central focus of the health care system. The hospital became the setting where medical, nursing, and other health professional students could be educated. The technological revolution led to an emphasis on hospitals for health care and to the increasing numbers of health personnel. Technological innovation has also led to increased specialization of health care personnel since World War II (Blayney, 1992). Williams and Torrens (1993) defined the acute care hospital as a health care facility in which most patients suffer from acute conditions requiring hospital stays of less than 30 days.

A dichotomy emerged. Educators continued the development of curricula that resulted in specialists who were narrowly trained. As a result, the health care workforce became highly specialized, especially the large group of personnel known as allied health professionals, including respiratory care practitioners.

Employers, however, have sought more broadly prepared generalists. A consequence has been the increase in idle time for professional workers—full-time specialists—who cannot be kept productive for an entire shift. Idle time has become expensive and wasteful. Making significant changes in health care to improve productivity, reduce cost, and maintain quality of care has become a key challenge (Blayney, 1992).

A serious productivity problem for hospitals has been the chronic shortage of nurses and other allied health professionals. In Florida beginning in 1988, the nursing vacancy rate was 15.85% (Florida Hospital Association Management Corporation, 1988), and the respiratory therapy vacancy rate was 12.6% in Florida acute care hospitals (Florida Hospital Association, 1988). These shortages were expected to continue into the future. However, the Pew Health Professions Commission (1995) reported that surpluses in the physician, nurse, and pharmacist populations may affect specialties, including allied health professionals.

Hospitals have also faced a mismatch between clinical competencies needed and the availability of health care workers possessing them. This mismatch was projected to continue into the 21st century, forcing hospitals to make more efficient use of the clinical skills of their nurses and clinical specialists (Blayney, 1992).

According to the Pew Health Professions Commission (O'Neil et al., 1993) and Blayney (1992), the health care system needs to develop a workforce that is flexible, versatile, productive, and cost-effective to meet future needs. Additionally, the health care system will need to use outcomes data more effectively, and consolidation of many of the more than 200 allied health professions into multiskilled professions may need to occur within hospitals (Pew Health Professions Commission, 1995).

Lathrop (1993) discussed restructuring service delivery and the advantage for multicompetent practice in a patient-centered care setting. This restructuring to permit the development of multiskilled practitioners would utilize personnel who are already practicing clinically.

Swearington (as cited in Blayney, 1992) stated that health professionals must begin thinking of new ways, changing approaches and expectations, and adopting much more comprehensive and global views to secure the resources needed to carry out their mission. The need for new ways to use allied health workers has also been advised by the Pew Health Professions Commission (O'Neil et al., 1993) and the American Association for Respiratory Care (1994a).

The multiskilled practice movement has been in response to the need for new manpower utilization. Beachey (1988) identified the movement as important in hospitals of all sizes. The necessary motivation to expand the training and utilization of multiskilled health practitioners in hospitals is projected to come from three primary sources: (a) hospitals who report definitive cost savings and provide a model for other hospitals, (b) departmental managers and professionals who recognize the benefits of cross-training to their patients, and (c) human resource philosophers who advocate empowerment and incentives (Blayney, 1992).

Historically, personnel with skills from multiple health areas have been used in a variety of health care institutions, including rural and small-, medium-, and large-sized hospitals. Using one highly productive, multiskilled health practitioner, as opposed to two or more

single-skilled workers with idle time, can definitely save money, particularly in overtime and on-call costs. Reasons why hospitals have employed multiskilled health workers include (a) increased flexibility and efficiency of staffing, (b) increased cost-effectiveness, (c) shortages of skilled labor, (d) improved job satisfaction among employees, and (e) improved customer and consumer satisfaction (Bamberg et al., 1989).

The preparation of multiskilled health practitioners requires specific educational planning. Implications for the design and implementation of programs for the employment of multiskilled health practitioners are that (a) specialization has inherent limitations and has been taken to extremes in health services, (b) new approaches to organization and job design are needed, and (c) there is a need for flexibility in cross-training and utilizing health care personnel (Blayney, 1992; Pew Health Professions Commission, 1995).

The challenge facing health care providers has been in restructuring health care organizations, health care jobs, career mobility systems, and compensation practices to achieve access, equity, quality, and cost-containment goals. The multiskilled health care practitioner concept has offered one promising model and has been viewed as playing an increasingly significant role (Blayney, 1992).

Health Care Personnel Regulation

Florida is an example of a very highly regulated state for the health care professions, including respiratory care. This has created difficulties for hospitals seeking workforce flexibility (Florida Hospital Association, 1993).

The Allied Health Articulation Task Force reported that Florida, as of 1991, regulated 36 different categories of allied health care professionals; this was in addition to the licensing of nursing personnel (Florida Department of Education, 1991). A dichotomy thus existed, with each licensed group focusing on its particular specialized needs. At the same time, hospitals were under intense pressure to use human resources more efficiently and across categories of workers (Florida Hospital Association, 1993). Blayney (1992) reported that within the health professions, individual licensure has been the most restrictive of state regulations and has created legal barriers for cross-training licensed personnel.

When an occupation is granted state regulation, the state statute authorizes a board, usually composed of members of the regulated occupation, and provides them with broad powers to regulate the occupation. Approval of education, training, and experience of the practitioner falls under the authority of the board. Likewise, the board serves as the gatekeeper, regulating entry into the profession and meting out discipline to members of the profession. Therefore, the occupations are essentially self-regulated.

Critics have complained that some requirements for licensure have been so rigid as to exclude many potential practitioners. These requirements, which have the effect of limiting the number of practitioners, may have served to increase the incomes of those professionals (Blayney, 1992). However, a 1993 study by the American Association for Respiratory Care (AARC), in collaboration with Arthur Andersen and Associates, found that salaries were not elevated for respiratory therapists in regulated states.

Regulation of health care professionals has been advocated to enhance public safety,

primarily by setting standards for entry, establishing continuing education requirements for license renewal, and stating disciplinary grounds and actions for unsafe practice (Respiratory Care Act, 1984). The Florida Hospital Association (1993) Licensure 2000 Task Force recommended changing to a competency-based system to evaluate professionals' abilities to enter or continue professional practice, as this might better protect the public from unsafe practice.

Blayney (1992) reported that as a result of the tremendous growth in the number and types of health care workers since World War II, states have had problems keeping their licensing laws current regarding the new health occupations and clearly distinguishing between job functions and job specifications. These limitations on personnel and performance have prevented optimum manpower mixes from being utilized and may have led to inefficiency and higher costs in hospitals, clinics, and physician offices (Blayney, 1992).

Personnel licensure has restricted the supply and flexibility of health care worker utilization in hospitals. Licensure may have resulted in higher professional vacancy rates, caused barriers to practice, and restricted the ability of hospitals to be flexible and creative in meeting the needs of patients. In response to this situation in 1993, the Florida Hospital Association sponsored the Licensure 2000 Task Force to assist hospitals in dealing with licensure and overcoming barriers and restrictions in Florida hospitals.

An additional regulatory problem has been the rigidity of licensing laws in regard to educational and experience requirements (Blayney, 1992). Bruhn (1993) stated that accreditation has become the emperor of allied health education. Concerns about accreditation include its high costs, fragmentation, process orientation, lack of representation of nonprofessionals on accreditation bodies, emphasis on professional independence, and lack of evidence to support standards.

Although accreditation of school programs in allied health is voluntary, graduates, in order to be eligible for individual credentialing examinations and licensure, must graduate from accredited programs. Accreditation has, for all practical purposes, become mandatory.

Pressures to reduce health care costs must include educational programs because schools typically have been regionally accredited. Specialty accreditation is duplicative for faculty, staff, and administrative personnel, who must prepare self-studies and undergo site visitations. Specialty accreditation of allied health educational programs has also been identified as an additional financial burden for schools (Bruhn, 1993).

Professional organizations may have also acted as barriers to flexible personnel usage. Although practitioners in the health care system have recognized and accepted the benefits of multiskilled personnel, professional organizations have often viewed cross-training as a threat. This resistance has been due to professional priorities that were more aligned with professional organization interests than with those of employers, patients, or co-workers (Blayney, 1992).

Lathrop (1993) reported that increasing specialization within hospitals has followed a trend toward specialized educational preparation. The proliferation and codification of professionals has resulted in their achievement of guild status, which has not only protected the public from unqualified practitioners, but has also created a mechanism for

enhancing job security by limiting the supply of potential staff members.

Blayney (1992) identified the importance for health care cost-containment strategies to be developed in concert with health manpower policies both at the macro and micro levels. Major health care system changes have been most effective when constraints on the flexible use of health personnel have been reduced.

As health care payers have sought to control costs, it has been imperative for hospitals to find ways to increase both productivity and the number of health care professionals without significant cost increases (Florida Hospital Association, 1993). Beginning in 1993, Florida responded with the following initiatives to address these regulatory restrictions: the Florida Hospital Association's Licensure 2000 Task Force and the Agency for Health Care Administration.

The first initiative was the Licensure 2000 Task Force, sponsored by the Florida Hospital Association (1993), which brought together leaders from hospitals, nursing, and the allied health professions. The focus of the task force was on those health care professionals typically employed by hospitals. The charge to the committee was to identify ways to foster constructive regulatory change, including licensure and education, in Florida.

Recommendations from the Licensure 2000 Task Force were forwarded to the Florida legislature for regulatory consideration. These recommendations included (a) encouraging professional boards to work toward having flexibility and consistency in all health care practice acts; (b) rewriting the practice acts of health professions using the nursing and respiratory therapy practice acts as models, thereby allowing for greater flexibility in the use of manpower; (c) identifying areas where cross-training of personnel would be acceptable; (d) developing models for cross-training; (e) working with professional organizations to reduce licensure barriers and enhance portability of licensure nationally; and (f) working with accrediting bodies to adopt national standards to support regulatory consistency between all states (Florida Hospital Association, 1993).

The second initiative was from Florida's Agency for Health Care Administration (AHCA), which examined personnel licensing and training issues pertaining to the shortages of health care workers and statutory rural hospitals (AHCA, 1994). According to Hospital Licensure Rural Hospital Definition (1985), Section 5 of the Florida statutes, a statutory rural hospital is defined as an acute care hospital with 85 licensed beds or less that has an emergency room and is defined as rural by the United States Census Bureau.

AHCA was created to consolidate regulation of all licensed personnel in Florida and replace other state agencies responsible for regulation such as the Department of Professional and Business Regulation. Recommendations from AHCA (1994), included in the proposed 1994 Florida Rural Health Act, identified the need for personnel cross-training and the necessity of amending the licensing acts for nursing, radiological technology, respiratory care, and clinical laboratory to allow the legal cross-training of personnel. Additionally, AHCA recommended the creation of a multiskilled cross-training program (Multiskill Cross-Training Certification, 1995).

Blayney (1992), in advocacy of multicompetent practice, identified strong incentives to reduce health care costs in—and increase flexibility of manpower utilization through—regulatory reform. The Pew Health Professions Commission (O'Neil et al., 1993) supported Blayney's position when it reported that for health care reform to be successful,

it must be broad and address the need for increased regulatory flexibility, public safety, and health care education system reform. Shrake (1994) also stated that multicompetency training is an inevitable part of health care reform.

Health Care Costs

Health care costs in the United States have been a problem and continue to rise (Frank & VandenBos, 1994). Health expenditures in 1985 were $420 billion and 10.5% of the gross domestic product (GDP). By 1990, these figures had grown to $675.7 billion and 12.4%, respectively (Health Care Financing Administration, 1991). By 1993, total health care expenditures were estimated at more than $898 billion, comprising over 14.3% of the GDP.

The United States health care system has evolved into the most costly in the world, with large segments of the population lacking insurance coverage. Additional major contributors to the high costs have been the expenses of medical technology and specialized health care personnel (Frank & VandenBos, 1994).

Health care reform became a political issue during the 1992 presidential campaign, with the middle class ranking it among the leading campaign issues. These health care issues included the structure and operation of the health insurance system, the composition of the health workforce, and mechanisms to expand access to health insurance for the uninsured (Frank & VandenBos, 1994).

Although national health care reform was unsuccessful in 1994, health care providers were expected to be more flexible in service delivery (Frank & VandenBos, 1994), with the states becoming experimental laboratories for health care reform. Health care delivery system reform also emphasized moving the financial risk from insurance companies to the providers of services, including hospitals and physicians (Frank, Sullivan, & DeLeon, 1994).

The Florida Hospital Association (1995) reported that Florida health care reform has been active in the state legislature. The Florida Health Security Plan was premised on a federal waiver that would empower the state to improve management of the Medicaid program and use the savings generated to subsidize private health insurance for working citizens ineligible for Medicaid. This would improve access to care and allow cost-control oversight. AHCA has been examining methods to eliminate regulatory duplication due to the consolidation of licensing programs for health care professionals and facilities (Florida Hospital Association, 1995).

The health care industry has been the nation's third-largest employer, with labor costs accounting for about 55% of all hospital expenditures (Blayney, 1992). Efforts to change the health care delivery system have been focused on reducing the complexity of hospital structures and processes that are redundant, narrow, and wasteful. Restructuring of hospitals has included redefining jobs and the delivery of services (Scuderi, 1994). Lathrop (1993) called this restructuring "patient-focused care."

Bunch (1994a) reported that health care service delivery and cost control have been closely related. It was anticipated that the paradigm shift in health care would call for reversal from traditional "fee-for-service" to a "capitated" model, such as managed care, with overall payment being predetermined. Institutions that traditionally focused on keeping their beds full would be required to find new and better ways to reduce inpatient

stays, because under capitation, profits would be derived from increasing the number of lives covered by the health plan, not by increasing the utilization of inpatient services.

Wright and Dudley (1994) provided support for patient-focused care, stating that hospital administrators have faced a massive movement in health care reform and the managed care market. The former fee-for-service industry, according to these writers, has become extremely competitive and cost-conscious in the past few years. Since hospital administrators have been responsible for the financial viability of the hospital, they have attempted to simultaneously enhance efficiency and minimize costs while maintaining or improving the quality of services.

Horn (1994) reported that the hospital itself has been compounding the problem of improving service delivery by evolving into highly departmentalized institutions. This has resulted in tremendous differentiation, even though the various departments shared resources and were, to some degree, interdependent. Before any real progress could be made fiscally, it was essential to identify areas of inefficiency, look at areas where staff could combine jobs, identify best practices, and streamline patient care. This came under the heading of "work redesign," defined as the process of evaluation of various work responsibilities with the intent of combining or isolating responsibilities for the sake of quality and efficiency.

Lathrop (1993) reported that the misallocation of spending has been caused by specialization, overly complex and inefficient services, and a general lack of coordination between numerous hospital departments. Also, it has been argued that hospitals have become too specialized in their services, with too many departments and too many personnel seeing any one patient. The result has been delayed patient care and increased costs.

Wright and Dudley (1994) proposed solutions that revolved around creating "super units" that combine and integrate patient types, redeploy personnel in ancillary departments, and cross-train personnel for multicompetent practice. Productivity, cross-training, and controlling costs are prominent areas being considered in hospital restructuring for service delivery.

Personnel regulation has also been costly. When health care personnel are inhibited from changing fields or from advancing in their field because of rigid requirements imposed by state legislation, the costs of health care rise. Higher costs to consumers, reduced access to health care services, and reduced flexibility for health care managers have increased as licensure has become more restrictive. The tightening of requirements and lengthening of educational programs have contributed to higher costs of entry into a profession (Blayney, 1992).

Curriculum

The Pew Health Professions Commission (O'Neil et al., 1993) indicated that the demands of changing the health care system have required more integration among and within the allied health disciplines in teaching and service delivery than currently exists. Health care reform efforts have neglected essential elements for reforming the system, namely, the education and re-education of health care professionals.

The Pew Health Professions Commission (1995) recommended that health

professional education be restructured to make efficient use of allocated resources. The focus of allied health curriculum should be on related discipline clusters, multiskilling, and interdisciplinary core curriculum.

Bruhn (1993) advocated improved integration between disciplines. This should be accomplished educationally by changing the ways in which allied health students learn and allied health educators teach, such as through increased interdisciplinary, problem-based learning.

The Pew Health Professions Commission (O'Neil et al., 1993) reported that the evolving nature of the United States health care system into managed care would continue to require health professionals with different skills, attitudes, and values; it also stated that the boundaries of the health professions would need to change faster during the latter part of the 20th century. This rapid pace of change is expected to create a demand for the skills of collaboration, effective communication, and teamwork.

The report of the Pew Health Professions Commission (O'Neil et al., 1993) was based on a widespread consensus that the nation's future health care needs would require a system that was balanced between specialized and primary, or generalist, care. The challenge would be to build a generalist perspective into a narrowly focused, or specialist, culture.

The National Health Care Skill Standards Project (1994) provides a foundation for multicompetent practice based upon core skills for all health care workers. In addition to the core, four occupational clusters are advanced: the therapeutic cluster, diagnostic cluster, information services cluster, and environmental services cluster.

The development of the multiskilled health practitioner has been advocated by health care experts, including the Pew Health Professions Commission (O'Neil et al., 1993; Pew Health Professions Commission, 1995), AARC (1994a), Florida Hospital Association (1993), Multiskill Cross-Training Certification (1995), Lathrop (1993), and Bamberg et al. (1989).

Blayney has been identified as a major spokesperson on multiskilled curriculum issues (Bamberg et al., 1989). Blayney believed that given the increasing complexity of health care, the practitioner of the future must be more broadly educated rather than trained. Blayney also recommended that the future practitioner be prepared with technical training for new competencies, critical thinking, and problem-solving skills, and with a knowledge of ethical and legal issues as they relate to health care. More emphasis will have to be placed on human relations skills, patient teaching, preventive medicine, and emergency medical services. Burkes (1991) reported that attitudes toward use of computers for information management will also need to improve for career success.

Recommendations for multiskilled health practitioner curriculum development have advocated sequenced learning experiences to promote understanding of underlying concepts and instruction in a protected environment where students are closely supervised and given routine feedback on their performance. Also, the curriculum must, according to Blayney (1992), provide multiple opportunities for students to practice clinical skills in a setting where patients are not affected by slow or inadequate performances.

In Florida, administrators at Lakeland Regional Medical Center restructured their

general surgical services into what has been called a patient-focused care unit. The hospital's education department established a patient-focused university to cross-train health care service delivery personnel. Three general considerations have been used to determine competencies for cross-training professionals at Lakeland Regional Medical Center for multicompetent practice: (a) the competency's utilization volume must be high enough for the competency to be achieved, or mastered, and maintained over time; (b) legal flexibility must exist to allow cross-training between regulated professions; and (c) the individual must have time to perform competencies in addition to regular duties (Borfitz, 1993).

Cross-training should be tailored for individual hospital needs, and it may be achieved through continuing education offered to already-employed clinical practitioners. Various forms and locations of training have also been used, including in-house (hospitals), college courses, commercial courses, training in other health care facilities, and on-the-job training (Bamberg et al., 1989).

Educational program curriculum for health professionals should be designed to meet three common objectives: (a) to ensure that skill development is founded on sufficient theory to enable graduates to identify and solve clinical problems; (b) to prepare graduates who understand the need for safety procedures, practice in a safe manner, and recognize when safety is breached; and (c) to ensure that graduates can recognize the limits of their abilities and know to request assistance when needed (Blayney, 1992).

Fredericksen (1986) described curriculum and instruction for successful cross-training that placed an emphasis on learner accomplishments. The five-step training sequence includes (a) description of skill, (b) demonstration of how it is performed, (c) practice, (d) provision of feedback, and (e) continuation of practice until learner proves competence.

The following principles of adult education have been recommended for incorporation into the multiskilled curriculum: (a) ensuring that the curriculum is directly applicable to the students' work, (b) considering conflicting priorities when scheduling sessions, and (c) having greater flexibility and options available for the adult student. Accommodating the more mature learner has proven challenging, but specifying rules and regulations and letting students know exactly what is expected of them has had the best results (Blayney, 1992).

Allowing employees to self-select to be cross-trained has been advocated by Warren (1978), Ackroyd (1990), and Patterson (1992a). Employer selection of personnel for multiskilled training also has significance and has been based upon consideration of an individual employee's makeup, background, and commitment to the concept. Criteria for selection have included identifying people with flexible personalities who could handle change and matching clinical skills with new clinical roles (Blayney, 1992).

Shrake (1994) has presented a multiple-plane/multiple-competency strategy for preparing multicompetent practitioners, based on the concept that employees must become more versatile. Key points include having employees continue their formal school-based education and pursue additional credentials and having employers assist employees through continuing education.

Section II

Respiratory Care Personnel and Cross-Training

Health care executives have advocated a radical solution to the current, expensive health care delivery system: cross-training personnel. The idea has been to train personnel to perform multiple tasks so they can be deployed more efficiently. Critics have stated that cross-training has increased costs and eroded quality of care because workers have lost a measure of expertise (Perry, 1991). However, Blayney (1992) reported experiences with cross-trained personnel that have shown a variety of benefits such as lower costs, increased customer satisfaction, reduced employee downtime, easier recruitment of high-quality personnel, and improved employee satisfaction.

In Florida, respiratory care personnel have been identified as ideal for cross-training, due to the flexible nature of state regulatory requirements. The Florida Hospital Association (1993) Licensure 2000 Task Force recognized that respiratory care licensure was based on national credentialing mechanisms, allowing greater portability of licensed personnel between states.

Because cross-training has required compliance with state regulations, the Licensure 2000 Task Force recommended that Florida licensure acts be restructured to be flexible, like those of respiratory care and nursing. The Licensure 2000 Task Force also recommended that Florida licensure acts be restructured to allow cross-training of personnel in Florida acute care hospitals (Florida Hospital Association, 1993).

The need for cross-training as a means for diversification of health care professionals into multicompetent practitioners has been advocated (AARC, 1994b; O'Neil et al., 1993; Pew Health Professions Commission, 1995). Beachey (1988) reported that nursing and respiratory care have been identified as having the greatest potential for benefit by cross-training for multicompetent practice. The Florida Hospital Association (1993) supported this, reporting that for the multidisciplinary approach to be successful, a greater collaborative practice between nursing and respiratory care must be developed. The proceedings of the AARC's (1994a) Second National Consensus Conference on Respiratory Care Education concluded that in the future, the advanced respiratory care practitioner would be the multiskilled practitioner.

The AARC (1994b) identified the attributes and rationale for using respiratory care practitioners (RCPs) as multiskilled providers and as clinically efficient care providers:

1. RCPs are on hospital duty 7 days a week, 24 hours a day.
2. RCPs are one of the few allied health professionals to develop and employ clinical practice guidelines to control utilization.
3. Educational preparation for RCPs requires physics, biology, pharmacology, anatomy, and lab sciences, which increases the opportunities for successful cross-training.
4. RCPs possess analytical and assessment skills needed for efficiency and controlling costs.
5. RCPs have a large skill base, which makes adding new skills through cross-training faster.

6. RCPs provide care in all care settings, including hospitals, nursing homes, doctors' offices, and rehabilitation centers.

7. RCPs have a longstanding, cooperative relationship with the physician community.

8. RCPs have a history of working collaboratively with nursing as a team.

9. RCPs have a proven track record as care coordinators and are proven candidates for cross-training.

10. RCPs are continually expanding their scope of practice and are a positive resource in any care setting.

Lathrop (1993) supported respiratory therapists changing their singular focus to become members of a multiskilled care team. Lathrop believed that in a decentralized structure, the respiratory therapist's role would change to include designing cross-training programs for staff, delivering curriculum and instruction, and conducting quality reviews throughout the facility.

SECTION III

Competencies for Cross-Training Respiratory Care Personnel

Respiratory care personnel have been identified as an excellent target population for cross-training in competencies for multicompetent practice. RCPs have had the advantage of being available around the clock at the patient's bedside, providing direct patient care and performing clinical diagnostic testing (AARC, 1994b).

Borfitz (1993) found that Lakeland Regional Medical Center (LRMC), since 1989, has prepared respiratory therapists successfully for multicompetent practice with educational preparation in anatomy, physiology, pharmacology, and medical technology. Respiratory therapists have also been cross-trained in drawing blood, inserting naso-gastric tubes, and starting IVs.

Researchers have advocated competencies from four professional areas for the cross-training of respiratory care personnel for multicompetent practice: nursing, cardiopulmonary, clinical laboratory, and radiological technology. The four categories and associated competencies were selected based on recent research and current practice. The proposed competencies were initially identified in Florida's Multiskill Cross-Training Certification (1995) and served as the primary elements for studying cross-training. Competencies advocated by Blayney (1992) and those incorporated in Florida's LRMC (1993) model provided further direction for refinement into a comprehensive and representative list.

Nursing Competencies

Respiratory care personnel have been prepared to provide direct patient care at the bedside and have had a long history of working collaboratively with nursing (AARC, 1994b). Chosen from the proposed Multiskill Cross-Training Certification (1995), nursing competencies identified as appropriate for the cross-training of respiratory therapists or RCPs were (a) administering dressing changes, (b) performing sprain wraps,

and (c) taking vital signs; these competencies must be authorized by amending the Respiratory Care Act.

LRMC (1993) has been cross-training respiratory care personnel to perform nursing competencies within their restructured patient-focused care model since 1989. These selected nursing competencies include taking vital signs and administering dressing changes. The Rural Health Act legislation also contained these two tasks. Additional nursing competencies identified by the LRMC model as significant were (a) assisting with activities of daily living, (b) initiating and monitoring intravenous (IV) therapy, (c) administering IV therapy, (d) administering medications, (e) ambulating patients, (f) performing range of motion exercises, and (g) assisting with pelvic examinations.

Blayney (1992) identified pelvic examinations as an appropriate nursing skill for the cross-training of respiratory care personnel. Blayney also advocated the nursing competency of administering injections.

Cardiopulmonary Competencies

Respiratory care personnel have been trained in cardiopulmonary anatomy and physiology, and laboratory sciences, as part of their educational preparation for practice. This has been required due to the closely interrelated functions of the human cardiovascular and pulmonary systems (AARC, 1994b). Cardiopulmonary competencies selected from both the LRMC (1993) model and Blayney (1992) were performing electrocardiograms and assisting with cardiovascular (hemodynamic) monitoring.

Blayney (1992) has also provided numerous cardiopulmonary competencies for incorporation in multicompetent practice: (a) performing Holter monitoring, (b) performing cardiac stress testing, (c) applying echocardiography, (d) performing cardiac rehabilitation, (e) assisting with cardiac catheterization, (f) assisting with intra-aortic balloon pump application, and (g) performing extra-corporeal membrane oxygenation.

Clinical Laboratory Competencies

Respiratory care training has included clinical laboratory preparation to obtain and test specimens from the human body, such as arterial blood analysis for acidity and blood gas values (Borfitz, 1993). Clinical laboratory competencies, selected from the proposed Multiskill Cross-Training Certification (1995) for the cross-training of respiratory care personnel and to be authorized through amending the Respiratory Care Act, included (a) analyzing automated complete blood count, (b) analyzing automated blood urea nitrogen, (c) analyzing automated electrolytes, (d) analyzing glucose, and (e) performing dipstick urinalysis. Cross-training to perform phlebotomy has also been advocated by LRMC (1993) and Blayney (1992).

Radiological Technology Competencies

Educational preparation in patient assessment, laboratory sciences, anatomy, physics, and bedside patient care have prepared respiratory care personnel to be cross-trained in performing radiological technology competencies (AARC, 1994b). Performance of a chest x-ray was the radiological technology competency identified for the cross-training of

respiratory care personnel by both Blayney (1992) and the proposed Multiskill Cross-Training Certification (1995). In addition, LRMC (1993) included processing the radiographic film.

Shrake (1995) reported that for cross-training to be cost-effective and productive in hospital restructuring, the cross-training must be at an equal or higher level of skill for the respiratory therapist and not simply at the "busy work" level. Shrake has termed this *decentralized cross-utilization*.

The proposed Multiskill Cross-Training Certification (1995) specified that Florida statutes for nursing, radiological technology, respiratory care, and clinical laboratory be amended in a uniform manner to legally allow cross-training in Florida hospitals. Eligibility for the resultant cross-training would specify that respiratory care personnel be licensed by the state of Florida, with a minimum of 2 years of professional experience. Although this act was not passed into Florida statute, it did serve as a basis for this study.

Competencies for the cross-training of respiratory care professionals for multicompetent practice were identified and represent the four professional areas of nursing, cardiopulmonary, clinical laboratory, and radiological technology. The proposed Multiskill Cross-Training Certification (1995), LRMC (1993), and Blayney (1992) advocated these competencies. However, for cross-training to be effective, the work environment must be addressed.

Section IV

Job Redesign Factors for Restructuring the Work Environment

Lathrop (1993) described restructuring as a fundamental shift in the way a company does its business. Restructuring has often appeared to be obvious and easy in retrospect; however, hospitals in particular have been very traditional in their operations and have had structural problems due to complexity and specialization. Lathrop advocated structural changes for the improvement of hospital service delivery, including the cross-training of health care professionals for multicompetent practice and patient-focused care units.

To accomplish restructuring, Scuderi (1994) advocated redefining jobs and the delivery of services. Scuderi felt that the patient-focused care model would require extensive organizational restructuring of both personnel and facilities.

Numerous writers in the 1990s addressed health care reform and the resultant restructuring of hospitals. Wright and Dudley (1994) reported various forms of restructuring occurring across the United States. The end result has often been a hospital structure that is conceptually attractive but has not met the cost-effectiveness goal of restructuring. Bunch (1994b) found that even with the demise of federally mandated health care reform, states have initiated methods to control costs ranging from wellness programs in Minnesota to rationing in Oregon to "cookbook" medicine in Maine.

Shrake (1995) made the point that utilization control due to restructuring and cross-training has been the major cost-reduction strategy used by hospitals. He felt that real opportunities for saving in the future may be due to eliminating unnecessary care and

may also concern the entire continuum of care from hospital inpatients to those receiving home care.

Wright and Dudley (1994) further reported that hospitals have created "super units" that combine a few smaller patient units by aggregating similar patient groups. Ancillary departments have been redeployed or decentralized to these units, with personnel being cross-trained to become multiskilled practitioners.

In an example from Florida, Merchant (1994) described a patient-focused task force in which the respiratory care section provided clinical care expertise as members of the care team. Reported outcomes were that respiratory therapists delegated tasks but did not relinquish the responsibility of providing appropriate pulmonary care, and patient-assessment evaluations were valuable for overall patient care. Additionally, Lathrop (1993) and Borfitz (1993) reported strong support for respiratory care to have continued involvement in job redesign efforts.

Flaherty, Pruitt, and Robertson (1995) believed that patient-focused care for work redesign was being implemented nationwide by hospitals reconfiguring their functions. This involved decentralizing the hospital structure and hierarchy to some extent.

Vogel (1993) characterized patient-focused care as the decentralization of services. This decentralization was characterized by the cross-training of personnel from different departments to provide basic care, simplifying and redesigning work to eliminate steps and save time, and increasing the involvement of patients in their care. Vogel also felt that patient-focused care projects would be slowed by workers' fears of new responsibilities and new reporting relationships.

LRMC (1993) has been cited as a "bellwether" among institutions interested in restructuring for patient-focused care (Blayney, 1992; Borfitz, 1993; Lathrop, 1993). LRMC began its patient-focused care in 1989 by restructuring the general surgical unit, which featured a pharmacy, clinical laboratory, and radiographic suite. Professional personnel, including nursing and respiratory care, were cross-trained to work on self-directed teams as multiskilled practitioners (Borfitz, 1993).

Schartner (1993) provided six basic principles that have been necessary for successful patient-focused care implementation: (a) clustering patients into groups by diagnosis, utilization of services, or physician; (b) decentralizing resources by moving everything closer to the patient; (c) simplifying processes to eliminate steps that do not contribute to the desired patient outcome; (d) creating flexible, cross-trained jobs and using appropriate staff to perform the jobs; (e) creating self-directed work teams; and (f) making organizational changes to support the team.

Borfitz (1993) reported that construction at LRMC for patient-focused care and decentralization had taken 6 months, with costs in excess of $1 million per unit.

Brider (1992) defined patient-focused care as decentralizing ancillary services and cross-training staff to supply up to 90% of services on the unit. In that setting, the patient would only leave the unit for major procedures. Lindamood (1993) supported Brider's position by stating that patient-focused care has been a significant development in health care restructuring for improving and streamlining hospital performance. However, Saiter (1993) reported that nurses working on patient-focused care units did not demonstrate greater satisfaction with the job or improved motivation toward the work setting.

Horn (1994) defined work redesign as the process of evaluating various job responsibilities with the intent of combining or isolating responsibilities for the sake of quality and efficiency. Complete communication and employee acceptance have been presumed to be essential to the success of job redesign.

Bunch (1992) also found that employee buy-in and employee comfort level with the patient-focused role have been important for preparing respiratory care personnel in this redesign setting. Ackroyd, Wilson, Painter, & Fingers (1994) reported that respondents' intrinsic orientation toward work and perceptions of the general working conditions in the organization were two strong predictors of allied health practitioners' work satisfaction in the ambulatory care and hospital setting.

Job Redesign Factors

The identification of interrelated job redesign factors is of major significance in preparing personnel and institutions for job redesign and the multicompetent practice model (Ackroyd, 1990; Ackroyd, Bamberg, & Hall, 1992; Ackroyd et al., 1994). Herzberg (1966) presented a two-factor theory of motivation in which work performed on the job was presumed to be an important factor. Job content in this context was viewed as a significant motivator within the working environment.

Ackroyd (1990) studied pay, promotion, and work as job-related variables for single- and multi-skilled health workers. He indicated that work performed on the job was a significant predictor of job satisfaction for all types of respondents. Ackroyd's study also found that the work variable for multiskilled radiographers was greater than it was for single-skilled workers, and that the pay variable significantly predicted job satisfaction for the single-skilled group only.

Ackroyd et al. (1992), in a related study, found that the nature of the work performed had a positive contribution to overall job satisfaction for medical laboratory personnel. They indicated that job redesign or enrichment accomplished by adding tasks of increased complexity and challenge was possibly more effective than simply enlarging the jobs with lower- or parallel-level tasks.

Job redesign that includes the formation of teams has been prominent in the literature. Manz (1992) believed that by the beginning of the 21st century, 40 to 50% of American workers may be members of self-managed teams. Patterson (1992a) revealed that outpatient surgical centers had cross-trained nurses and formed teams to increase staffing flexibility and develop worker cohesiveness. Patterson (1992b) also found that in self-managed units, employees had supervised their own work with actual supervisors acting as coaches to facilitate rather than dictate activities.

Langham (1992) discussed the positive influence of the mentor-protégé relationship on improving job satisfaction for staff nurses. Minors (1993) presented findings that financial performance in a shared governance team organizational model had had a positive influence, but only during the first year of operations.

Englebardt (1993) and Kratina (1990) studied the concept of including the overall work climate for job redesign. Englebardt stressed that three managerial behaviors (team building, recognizing, and problem-solving) and one managerial characteristic (managerial experience) affected staff nurses' perceptions of the work climate and,

therefore, should be included in work climate models. Kratina felt that the culture concept should be applied to investigating job satisfaction and staff turnover.

The use of job redesign to accomplish hospital restructuring has necessitated the cross-training of respiratory care personnel for multicompetent practice and the development of self-managed teams (Lathrop, 1993). LRMC has cross-trained RCPs for multicompetent practice, decentralized services into patient-focused care units, and restructured jobs to improve productivity (Borfitz, 1993).

In reviewing the literature, the following four job redesign-factor categories were identified as being relevant for successful multicompetent practice and hospital restructuring for service delivery: (a) work characteristics, (b) education and training, (c) satisfaction, and (d) incentives.

Work characteristics. The importance of the employee's perception of overall work culture as an intrinsic factor of job satisfaction has been discussed by numerous writers, beginning with Herzberg in 1966. The concept of work has also been advanced for inclusion in hospital job redesign by Ackroyd (1990), Bruffey (1993), and Harper, Manasse, and Newton (1992).

Many researchers have advocated allowing the employee to choose to be cross-trained as a motivational method (Ackroyd, 1990; Patterson, l992a; Warren, 1978). Special preparation of supervisory personnel to supervise cross-trained workers from different disciplines has been advanced as significant by Englebardt (1993), Bell (1993), and Shelledy, Mikles, May, and Youtsey (1992).

Increasing skill complexity for cross-training has been supported by Ackroyd et al. (1992) and Hmelo and Axton (1989). Ackroyd et al. indicated that providing greater job challenge has been significant. Hmelo and Axton felt that increased diversification of skills for practice had had a positive clinical impact.

Education and training. Cross-training of respiratory personnel for multicompetent practice, as part of job redesign, has required educational preparation. Education and training has been identified as significant from the writing of Blayney (1992), Borfitz (1993), Denk (1992), and Lathrop (1993). Incorporation of new knowledge and theoretical education was considered necessary to accompany new skill development in the research of Denk (1992); Grady, Shortridge, Davis, and Klinger (1993); and Strohbach (1992).

Grady et al. (1993) and Martin, Dugan, Freundl, Miller, and Sharritts (1994) advocated the use of attitudinal and human relations training for inclusion in job redesign education. Strohbach (1992) presented the importance of clinical judgment and decision-making in educational preparation for cross-training. The need for safety training within job preparation for cross-training and the need for safety training within job redesign were championed by both Grady et al. and Abraham (1992).

Satisfaction. Justification for the multiskilled practitioner has been predominantly economic and has resulted in altered job tasks, roles, and relationships. These modifications may have altered workers' satisfaction with the job (Ackroyd, 1990;

Ackroyd et al., 1994). Satisfaction with work has been described as significant for job redesign by numerous writers, including Abraham (1992), Ackroyd (1990), Ackroyd et al. (1994), Bruffey (1993), and Lathrop (1993). Redesigning the job to allow multicompetent practitioners to maintain their primary professional skills was described in writings of Borfitz (1993) and Brider (1992).

Quality of patient care delivered has been identified as a significant motivator for job satisfaction (Brider, 1992; Shelledy & Mikles, 1987). Fredericksen (1986) emphasized streamlining work to allow for the cross-trained employee to perform the whole job. Supporting the cross-trained employee to accept or "buy in" to the multicompetent practice model was reported by Bunch (1992), Horn (1994), and Lathrop (1993) as needed for overall worker satisfaction.

Incentives. Incentives, as motivators, have been reported as significant for employee success with job redesign and cross-training. Increased pay and compensation for additional skills has been a major contributor to multicompetent practice success as revealed by Ackroyd (1990), Blayney (1992), Brider (1992), Fredericksen (1986), Lathrop (1993), Perry (1991), and Warren (1978). Shelledy et al. (1992) felt that increased, paid time off from work, as an incentive, was necessary for employee motivation. Abraham (1992), Blayney (1992), Englebardt (1993), and Warren (1978) advocated employee recognition. Ackroyd (1990) and Bell (1993) found increased career and promotion opportunities significant.

Finally, Blayney (1992) identified that job redesign and subsequent cross-training may be conducted in various sites. These locations have been within the same hospital, at another hospital, and in conjunction with an educational institution. Blayney also believed that cross-training could be accomplished using different combinations of sites.

Summary

This review covered four aspects of research pertinent to cross-training and job redesign for respiratory care in the United States and in Florida. Section I of this review revealed that the development of multicompetent practice had become a significant issue within health care reform. Since the 1950s, with increasing medical technology and population growth, health care costs have continued to rise and inefficiencies in service delivery have increased.

The increase in the number of allied health specialty professionals resulted in overspecialization within hospitals and educational programs. The restrictive nature of regulatory policies, especially in Florida, for health care, health professions, and educational institutions resulted in barriers to cross-training and pressures to control costs and improve service delivery.

Section II included a review of the literature for respiratory care personnel and cross-training. Respiratory care personnel have been advocated for this multicompetent role in hospitals because they (a) maintain continuous coverage 24 hours a day, 7 days a week; (b) have strong technical and scientific preparation; (c) provide patient care and

diagnostics at the bedside; and (d) have a large skill base for cross-training. Respiratory care personnel have also exhibited a history of care coordination and clinical decision-making in all care sites and have had positive relationships with fellow health professionals.

Section III identified the additional competencies respiratory care personnel could be trained to perform. Florida has been active in the cross-training of respiratory care personnel. Competencies identified for cross-training were from nursing, cardiopulmonary, clinical laboratory, and radiological technology. Three primary sources provided these competencies: Blayney (1992), Florida's proposed Multiskill Cross-Training Certification (1995), and LRMC's (1993) patient-focused care model.

Finally, Section IV discussed job redesign factors important in restructuring the work environment: (a) work characteristics, (b) education and training, (c) satisfaction, and (d) incentives. The need to redesign work into jobs allowing cross-training and successful multicompetent practice was also presented.

Application for Respiratory Care Education

Results of this review may serve as the basis for development of a cross-training curriculum model for respiratory care education. Such a cross-training model would be flexible in providing customization for individual hospital needs, allow partnerships between hospitals and educational institutions for cost-effective, high-quality training, and stimulate continuing curriculum and instruction cultivation.

The competencies for use within the model were identified from nursing, cardiopulmonary, clinical laboratory, and radiological technology. The model with these competencies should incorporate job redesign—as part of hospital restructuring—into the educational experience. The job redesign factors distinguished as relevant are work characteristics, education and training, satisfaction, and incentives.

Trends and outcomes, for both cross-training and job redesign, will require ongoing educational monitoring for respiratory care to thrive in the managed care environment. Further study is recommended as cross-training and restructuring efforts mature.

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