THE RELATIONSHIP BETWEEN EMPLOYER COMPETENCY RATINGS AND AFFECTIVE EVALUATION SCORES OF MEDICAL TECHNOLOGY STUDENTS

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CHAPTER I

INTRODUCTION

The education of medical technology students encompasses the cognitive, psychomotor, and affective domains. The process begins with the selection of students who have demonstrated ability in each domain and continues through graduation and successful job placement.

The curriculum of the medical technology program must provide learning experiences in the three domains. Clinical education programs have traditionally set high standards for knowledge and technical skills. Professional attitudes are more difficult to define, develop, and assess.

Educators have the responsibility and obligation to influence students in the development of attitudes and values consistent with professional expectations for a medical technologist. The design of curriculum can establish a learning climate that will facilitate students' ability to examine their feelings and values and to make decisions based on increased self-awareness. The evaluation of affective behavior should be on-going and serve as a progressive, goal-oriented developmental process for each student throughout the clinical year.

Need for Study

Krathwohl (1964) stated that there is a fundamental need for

research directed toward understanding the underlying process by which individuals undergo change in the affective domain. Explanation of the role which affect plays in the professional maturation of the medical technology student is another research imperative stated by Dietrich (1980). Zimmerman (1978) proposed that too much stress is placed the acquisition of theoretical knowledge and demonstration of technical skill. The result is an individual with poorly developed personal identity and interpersonal skills who is simply not prepared to cope effectively with the intense challenge of a social-work environment. He felt that in order to provide meaningful health services, there must be development of self and of interpersonal skills and attitudes. These needs coupled with the rising cost and decreased availability of allied health education dictate that each graduate of a medical technology program should be adequately prepared to accept and fulfill the broad responsibilities of the profession.

The graduate medical technologist is a product representative of the clinical education program in general. Each program must maintain certain accreditation standards. A prospective employer assumes that a graduate possesses at least a minimum competency in the areas of knowledge and technical skills. He will often discriminate between graduates based on professional attitudes and behaviors. Therefore, the program must also produce a product that meets employers expectations if job placement and continued employment are to be satisfactory.

In order to continue to meet the needs of the health care community, the following question should be asked by clinical educators, "Is our teaching method producing graduates with a high

potential for professional success?" Information regarding job performance of the graduate may be gathered from the employer following graduation from the medical technology program by using a graduate survey. It would be more useful if this information could be determined prior to graduation.

Statement of the Problem

The development and evaluation of professional attitudes among medical technology students is one of the most difficult, yet most important responsibilities of clinical educators for successful job placement and continued employment of graduates. The problem addressed in this study was to determine whether affective evaluation scores of medical technology students could be used as predictors of professional competency of graduates of a medical technology baccalaureate program. Previous research studies focused on the relationship between grade point average and student performance but few studies have described the relationship between affective learning outcomes and professional competency of graduates of medical education programs.

Purpose of the Study

The purpose of this study was to determine if evidence of learning in the affective domain can be used to predict professional competency of medical technology graduates.

Research Hypothesis

There is a relationship between employer competency ratings and

affective evaluation scores of medical technology students.

Objectives of the Study

The objectives of the study were:

1. To assess the affective learning outcomes of all medical technology students during a two year period in a hospital based clinical program using a standardized evaluation instrument.

2. To determine job placement of each graduate of the program in the study group.

3. To ascertain the level of professional performance of each graduate of the study group in their current employment position.

4. To compare information obtained to determine if a positive relationship exists between employer competency ratings and affective evaluation scores.

Assumptions

For the purposes of this study, the following assumptions were accepted by the investigation.

1. That the students selected for the study group (N=16) were similar to the 175 medical technology graduates of the institution.

2. That the affective evaluation scores reflect actual learning outcomes.

3. That the attitudes and answers of the participating employers were representative of the graduate's job performance.

Scope and Limitations

This study contained the following limitations.

1. The size of the sample (N=16) was limited due to the design of the medical technology program.

2. The study was conducted at only one institution.

3. As longitudinal, the study included the effects of history and mortality.

Longitudianl in its approach, this study provided the format necessary to plat the individual development patterns of the same students over a period of time. Difficulties encountered in this type of study were: (1) the limited number of students that could be followed, (2) the mobility of the study group, (3) the subjects that dropped out during the study, and (4) the restricted range of behaviors that could be assessed.

Definitions

The following definitions of terms are furnished to provide a more clear understanding of this study.

Medical Technology: That branch of medicine concerned with the performance of the laboratory determinations and analyses used in the diagnosis and treatment of disease and the maintenance of health (Williams, 1984).

Medical Technologist: A person who has obtained a sound foundation in the scientific principles involved and a proficiency in the performance of laboratory test procedures through education (Williams, 1984).

Clinical Education: Total professional education; the time spent in medical laboratory science courses as well as in the clinical laboratory facility.

Affective Domain: The area of learning in which the student develops certain interests, attitudes, appreciations, values, and emotional sets or biases (Krathwohl, 1964).

Affective Learning Outcomes: Evidence of development of specific professional attitudes and behaviors.

Professional Competency: Overall job performance as evaluated by the employer of the graduate.

Organization of the Study

Chapter I introduces the study with a brief description of medical technology education then presents the need for the study and a statement of the problem. The first chapter also includes the purpose and objectives of the study, research hypothesis, assumptions, limitations, and definition of terms. Chapter II reviews the literature from a historical perspective, including clinical teaching and evaluation in the affective domain, previous studies on predictors of performance, and concludes with professional expectations for a medical technologist. Chapter III reports methods and procedures utilized in this study, including the selection of subjects, creation of instruments, collection of data, and analysis of data. Chapter IV presents the findings of the study and Chapter V contains a summary, conclusions, implementations for practice, and recommendations for further research in the practice of medical technology education.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents a review of literature in the following areas: (1) clinical instruction in the affective domain, (2) evaluation of affective behaviors in clinical education, (3) research studies on predictors of clinical and job performance, and (4) professional expectations for a medical technologist.

Clinical Instruction in the Affective Domain

"The affective domain contains the forces that determine the nature of an individual's life and ultimately the life of an entire people" (Krathwohl, 1964, p. 91). Krathwohl had designed a logical system for ordering behaviors within a developmental approach. As a hierarchial structure, each behavior builds upon the preceding one. It stems from Bloom's (1956) Taxonomy for the cognitive domain. The affective taxonomy of Krathwohl is outlined as follows:

1. Receiving - the individual is willing to attend to the phenomena.

2. Responding - the individual actively attends by doing something about or with the phenomena.

3. Valuing - the individual makes an assessment that the

phenomena has worth and he/she is motivated by this commitment to the phenomena.

4. Organization - the individual organizes values into a system for guiding behavior.

5. Characterization - the individual has internalized a set of values which control his behavior (Kibler, 1970).

When writing objectives in the affective domain, the educator attempts to categorize learning that specifically involves feelings, beliefs, and values. Lynch (1977) defined nine categories of behaviors related to the performance of medical laboratory personnel:

1. Skill and competency in performance of tasks
2. Understanding and application of theory
3. Carefulness and concern for order and clarity
4. Efficiency and organization
5. Ability and willingness to assume responsibility
6. Interpersonal relations
7. Dependability and integrity
8. Communications
9. Personal appearance and grooming

Several of these categories (3-9) incorporate elements from the affective domain.

Kingston (1980) cited three reasons for writing instructional objectives in the affective domain. First, values which affect feelings and attitudes are present in the health care profession whether we acknowledge them or not. Second, health care is not just a matter of manual skills and intellectual knowledge. Finally, research has shown that it is misleading to teach solely for appropriate

cognitive objectives and assume that proper affective behaviors will result.

Clinical instructors may question whether they have the right to impose values and attitudes on their students. Program philosophy, curriculum, method of instruction, and daily interaction project to the student some value orientation. The position of the educator is then not whether values and attitudes should be taught, but which values and attitudes you want to teach and how you want to teach them. King (1984) feels educators must first examine their own attitudes if they are to be active participants in the teaching/learning process.

The systematic design of instruction begins with assessing the philosophy and goals of both the institution and the program. Program and course objectives can then be developed that are representative of the program. Specific objectives are derived that meet the present and future needs of the student.

Dietrich (1980) has observed that role modeling is the most common and effective way in which educators influence students' affective behavior. It is difficult, however, to control the developmental process using role modeling. Deyer (1981) has designed an instructional method using trigger films to simulate situations and stimulate discussion. The method allows the students to employ problem solving techniques in settings prior to actual exposure.

Snyder (1984) has described an experimental learning model for teaching professional responsibilities within a medical technology curriculum that employs principles of adult education and learning contracts to facilitate learning. The course utilizes case studies,

written learning activities, and discussion to relate to students' developmental needs and self-motivation. This method has proven to be a powerful and effective method of learning and resulted in higher learner enthusiasm. Student evaluation of the course for future benefit was high. Bunning (1977) reported on the implementation of a human relations training course as part of the medical technology curriculum. The purpose of the program was to produce positive changes in the participants' attitudes toward self and others, and to improve their interpersonal relationships. The outcome of the course indicated that attitudes of the participants were more positive.

In summary, Krathwohl defined the affective domain in 1964. Clinical educators recognized the need for instruction in the affective domain and the importance of developing affective learning objectives during the period from 1977 to 1984.

Clinical Evaluation of Affective Behaviors

"Throughout the history of mankind, evaluation, in some form, has been used to categorize human behavior. In the field of education today, evaluation is still a very important procedure" (Bell, 1975, p. 62). Bell conducted a study of the evaluation practices of 150 clinical laboratory educational programs. She identified subjectivity in evaluation forms as the greatest problem for educators in developing a valid instrument. Recommendations included formulation of professional standards and objectives, evaluation of personality traits separately from technical performance, and thorough training of faculty in the use of evaluation instruments. The purpose of evaluation is to improve performance. An effective evaluation process will determine

the progress students are making towards achieving the goals of the program and help them modify their behavior accordingly. The evaluation process provides counseling for students, motivation towards common goals, and specific criteria for future job recommendations. Fricke (1982) repeated the evaluation study conducted by Bell. She determined that a variety of evaluation formats were being used to evaluate students. Although there was still some subjectivity in the forms used, many programs had made an effort to overcome this problem by defining a minimum acceptable performance level and by using several laboratorians and instructors to evaluate students' performance.

Evaluation of affective learning outcomes should be measured separately from technical performance. Several types of instruments such as rating scales, checklists, and anecdotal records have been proposed by medial technology educators. Examples of some of these instruments have been defined in the following research studies. Bobek (1972) designed a forced choice rating scale using a continuum that required the instructor to focus his evaluation on definite specific behavioral statements. Snyder and Wilson (1980) developed a process skill approach that incorporated evaluation of all three behavioral domains in one instrument. A graphic scale format, in which the evaluator determined how closely the student's behavior correlated with the objective, was used. To be used as an effective evaluation tool, specific overt behaviors must be stated in terms of objectives. Fogleman (1982) collected evaluation forms from programs throughout the country. Fourteen categories of traits were identified as those evaluated by a majority of programs. These traits were grouped according to the affective domains established by Krathwohl. Behaviors for

each category were developed using a Likert-like scale.

The most extensive study on evaluation of clinical behavior was described by Lynch (1977). She discussed the problems of using rating scales developed by consensus of a small group. In order to reduce subjectivity, Lynch developed a behaviorally anchored rating scale through a Delphi process involving 26 independent medical technology educators from ten states. Isolated from 17 clinical performance scales and 142 critical incidents were 172 different behaviors related to the performance of medical laboratory personnel.

Each behavior was classified and rated according to its degree of effectiveness and importance. The procedure identified nine categories of behaviors in a rating scale (See Section 1 - Clinical Instruction in the Affective Domain). Lynch characterized this rating scale as high in content validity because of the method by which it was developed. She suggested that the performance rating scale could be used for the development of other rating scales, but should not be wholly adopted without modification to include goals and philosophy of the particular program. All persons who will use a rating scale should be involved in its development. Since the purpose of evaluation is to improve performance, the evaluation should be discussed with the student at frequent intervals in order to be effective. Evaluation forms should also include a section for comments from both the instructor and student, and no rating should be attempted if there has not been adequate opportunity to observe the particular behaviors in question.

Predictors of Clinical and Job Performance

The process of selecting medical technology students varies from program to program. The most commonly used criteria are grade point averages (GPA), letters of recommendation, and personal interviews. Numerous research studies have validated that grade point average is a reliable predictor of the success of students in medical technology programs. Some researchers recommended the use of non-cognitive characteristics in the admission process. Few research studies addressed factors that might be used to predict job performance of graduates of clinical education programs. The research in the area of performance could be divided into two major categories: (1) clinical performance, and (2) performance on the job.

Clinical Performance

The clinical laboratory is a complex working environment. Specimens are continually coming into the laboratory, "stats" must be integrated into the routine work load, and laboratory efficiency must be at its maximum. "The student in medical technology suddenly finds himself or herself in the fourth year of college in an entirely new and rather startling environment called the 'clinical facility'" (Johnson, 1975, p. 114). Students, like technologists, are expected to perform a variety of tasks at the same time. They must be flexible and adaptable to change. Students who value the importance of cooperation, who keep an open mind, and who can identify and prioritize important information from a complex environment experience less stress and more success in

the laboratory (Johnston, 1975). Students with certain personalities seem better able to cope with the clinical portion of the educational program.

Although academic ability seems important for clinical programs and certification examinations, students with high grades do not necessarily succeed professionally (Lehmann, 1984). More than academic ability is necessary to become a successful medical technologist. Rifken (1981) and colleagues have demonstrated the value of motor, problem solving, and communication skills, among others, in predicting non-academic success in medical technology programs. Their study confirmed that GPA is a good predictor of academic success but also emphasized the importance of non-academic predictors, such as career goals, problem solving, and manual dexterity, in predicting professional success. Blagg (1986) stated that the student who performed well in preprofessional courses continued to do so in clinical education. He indicated that personality variables seem especially important to those students with application GPAs less than 3.0. He suggested that programs might want to consider personality variables in borderline applicants to predict success in the educational program and to assist in career counseling and placement.

Keck (1979) suggested that both cognitive and noncognitive predictor variables should be included in investigation of the prediction of clinical performance in medical school. His study indicated that the noncognitive measures contributed information which is relatively independent of that contained in the cognitive measures and which is important for understanding and predicting future clinical performance. He proposed that almost all medical students are capable

of completing their medical education based on their cognitive level. But, the prime objective of medical education should be to select and train those who will perform best as physicians. Consideration of noncognitive criteria appeared to be essential to further this objective.

Job Performance

Firestone (1986) investigated whether scholastic achievement in a medical technology professional curriculum could be used to predict professional success in the field of laboratory science. She stated the importance of the students meeting minimum academic admission standards to increase the probability that they could complete the curriculum. If students failed to complete the program, professional success is of no significance. Firestone, became interested in determining if it was possible to identify predictors of professional success in the graduates of the medical technology program. She defined professional success in the field of laboratory science by an employer's evaluation of job performance and increased job responsibilities, promotion, or salary raises. Multiple linear regressions were used to determine if grade point average could predict salary or position of the technologist. They found that grade point average had no significant relationship to the position in which the graduate was employed or the salary of the graduate. Characteristics other than academic ability, such as years of experience, advanced degrees, and professional goals were important predictors of the professional success of medical technologists.

A similar study was conducted on a group of graduate nurses by Bolin (1984). In reviewing nursing literature, she found that there was little relationship between academic performance in a nursing program and subsequent job performance as a nurse. In her review of literature Bolin (1984) reported a meta-analysis of 46 studies by Hoyt (1965) on the relationship between college grades and adult achievement in the areas of business, teaching, engineering, scientific research, miscellaneous occupations, and non-vocational accomplishments. Hoyt's conclusion was that academic achievement and other types of student growth are relatively independent of each other. Bolin used five indicators to study graduate nurse competence. They were: (1) pre-entrance test scores, (2) final grade point averages, (3) state board examination scores, (4) clinical experience grades, and (5) employer competency ratings. Significant positive correlations were found between pre-entrance test data and final GPAs, pre-entrance test scores and state board examination scores, and certain clinical grades and employer competency ratings. Experiences obtained on the job were viewed as an uncontrolled variable by this researcher. Replication of the study was suggested.

Field (1984) studied clinical competencies of baccalaureate nursing graduates. He identified that most of the clinical nursing curriculum emphasized the cognitive domain. Concerns of employers of new graduates expressed that students did not come to them ready to perform their professional duties after graduation. He concluded that clinical objectives need to be written in the cognitive, psychomotor, and affective domains if the student is to be fully prepared for the real-life job market. He recognized that assignment of a number grade

to a student's clinical performance is a difficult task for educators.

Professional Expectations

Medical technology can be defined as "that branch of medicine concerned with the performance of the laboratory determinations and analyses used in the diagnosis and treatment of disease and the maintenance of health" (Williams, 1984, p. 1). A medical technologist is a person who has obtained a sound foundation in the scientific principles involved and a proficiency in the performance of test procedures. A certified medical technologist, MT(ASCP), must possess a baccalaureate degree in medical technology or a related science, have completed a clinical education program, and have passed a national certifying examination.

There is wide diversity of opinions in the clinical laboratory field regarding acceptable attitudes and expressions of those attitudes. There may be several correct ways to behave depending on the circumstances. Each person maintains their own set of internal, personal values but displays visible behaviors that the world sees. There are many aspects of the profession where a laboratory professional is expected to perform in a certain way regardless of feelings and beliefs. These behaviors can be taught, quantified, and assessed against a standard.

The following characteristics associated with laboratory health professionals are specified in the Clinical Laboratory Sciences Body of Knowledge (Aldrich, 1980) published by the American Society for

Medical Technology :

1. Ethics
   -reliability, responsibility, honesty, tact, compassion, relations with others.

2. Self-esteem and Personal Satisfaction
   -price, accuracy, efficiency, initiative, perseverance, confidence, adaptation to job stress

3. Insight
   -self-assurance, open-mindedness, cognizance of personal limitations, response to challenge, discerning needs.

4. Self-improvement and Personal Growth
   -acknowledgment of personal skills and knowledge, seeking new knowledge in the field, participating in continuing education

5. Co-workers and Employer
   -attendance, reliability, responsiveness, following directions and policies, teamwork, organization, encouragement, leadership

6. Accuracy
   -avoiding, detecting, reporting, and correcting errors
   -attention to detail, seeking advice when needed, correlating laboratory results with diagnosis

7. Time Restraints
   -prompt performance of tasks, prioritizing tasks, persistence

8. Patient Interaction
   -confirmation of identify, respect for patient's confidentiality, appropriate language level

9. Personal Appearance and Conduct
   -personal grooming
   -representative of the profession (pp. I3-I5).

Garcia (1986) developed 43 job performance standards for a medical technologist that specifically defined job tasks and incorporated attitude and interpersonal skills. Categories used were: (1) work quality, (2) job knowledge, (3) productivity, (4) dependability/ initiative, (5) attitude/interpersonal skills, and (6) compliance with

departmental policy. For each category standards were written at three performance levels--acceptable (meets standard), unacceptable (does not meet standard), and outstanding (exceeds standard). The new evaluation instrument clarified expectations of the employer, offered realistic challenges for the employee, and provided the institution with an objective mechanism for distinguishing exemplary performance by an individual.

Summary

The affective domain and purposes for teaching it were addressed. Program philosophy and goals need to be reviewed and incorporated in affective objectives. Teaching strategies appropriate to the content of the objectives must be designed and implemented. Effective evaluation processes and instruments need to be developed and reviewed. The student, the final product of the program, should be assessed throughout the educational process and following graduation by various means.

Research illustrated that cognitive factors impact the academic success of medical technology students in educational programs. There have been some indications that noncognitive variables serve as predictors of clinical performance and future job potential. Characteristics associated with laboratory health professionals specify many noncognitive, affective traits for a medical technologist.

CHAPTER III

METHODS AND PROCEDURES

This chapter details the methods and procedures for collecting data relevant to the purpose of the study outlined in Chapter I. Included are: (1) the introduction of the study, (2) the selection of the subjects, (3) the creation of the instruments to be used in collecting the information, (4) the collection of the information from the study group, and (5) the analysis of the data collected by the employer questionnaire.

Introduction

This study was conducted in a 900 bed community teaching hospital serving a city of 690,000 population and serving as a referral hospital for a 150 mile radius. All major medical services are available, as well as various modes of specialized care. The hospital employs over 3,000 people and has a medical staff of over 500.

The laboratory offers quality medical services utilizing the latest technologies. Students become acquainted with a wide variety of complex, automated equipment, as well as, exposed to non-automated procedures and basic instruments. There are over 500 different procedures available with over 1,000,000 tests being performed annually in the laboratory. The laboratory is accredited by the College of Pathologists (CAP) and the American Association of Blood Banks (AABB).

It is staffed 24 hours a day, seven days a week by over 100 certified health professionals.

The School of Medical Technology, established in 1964, provides an opportunity for carefully chosen young men and women whose general interests are in laboratory science to learn medical technology. It is a hospital based clinical education program affiliated with seven state colleges and universities. The clinical program provides the fourth year of a baccalaureate degree in medical technology.

Selection of Subjects

The study group consisted of all students (N=16) in the 1985 and 1986 classes of the medical technology program. The treatment of each subject was followed throughout the 13 month clinical education program. The subjects were rated by their respective employers following completion of the program. The experience of the subjects after treatment was out of the control of the researcher. This longitudinal study included the effects of history and mortality.

Creation of Instruments

Two instruments were used in collecting data for the study, the student affective evaluation instrument and the employer performance questionnaire.

The student affective behavior evaluation instrument was created in 1984 to assess the students' progress during the clinical year, as well as, their final affective learning outcome (See Appendix A). This evaluation was developed and designed through cooperation of all the clinical faculty. Criteria from Lynch's behaviorally anchored rating

scale (1977) were selected for review. The previous affective evaluation form and the hospital job performance standards for a medical technologist were also incorporated in development of the revised form. The hospital philosophy and mission statement, in addition to, the program goals and objectives were reviewed relative to the desired affective outcomes. The format of the instruction utilized a goal statement consistent with the expected competency of a graduate medical technology student. Faculty were provided orientation in using the evaluation forms including the provisions for progress reports. The affective evaluation forms were explained to the students during orientation at the beginning of the clinical year. The purpose of the evaluation was explained as a mechanism to help the student achieve the goals deemed as being necessary for professional success.

Each student rotated through five major clinical areas of the laboratory which used the affective evaluation instrument. The student was given a progress report based on the form at approximately three week intervals. The final affective learning outcome of the student was assessed at the conclusion of each of the five clinical areas. Points were assigned to the final evaluation based on meeting, not meeting, or exceeding the competency statement (See Appendix A).

The second instrument, an employer questionnaire, was developed to survey the employers of the medical technology students regarding the students' performance on the job following graduation. The questionnaire was reviewed by several state educators and laboratory managers at a professional meeting. It was divided into three areas: knowledge, technical skills, and professional attitude. Each area was

subdivided into five specific standards relating to that area. The employer was asked to indicate the current level of job performance of the employee by checking: "needs to improve", "meets", or "exceeds" for each standard. Points were assigned to the three levels of performance by the researcher upon return of the questionnaires in a manner consistent with the internal student affective evaluation. The questionnaire also asked if the employer was satisfied with the performance of the graduate and for additional comments (See Appendix B).

Collection of Data

Scores evaluating each student's clinical education were compiled from their graduate files. Information calculated included: entrance grade point average, clinical grade point average, and affective evaluation scores from the five major clinical areas. All information was kept confidential by use of a letter identification system.

The employer questionnaire was mailed to the employer of each graduate in the study group with a cover letter explaining the purpose of the study and requesting their assistance (See Appendix C). A self-addressed return envelope was included with the request. Questionnaires were returned for all 13 currently employed students from the study group. One student did not complete the program; two students were not currently working in a clinical laboratory.

Analysis of Data

To analyze the data, points were assigned to each standard on the employer questionnaire: needs to improve = 0, meets = 1, and

exceeds = 2. Points were totaled on each questionnaire. Points/grades for each student in the study group were tabulated from their cognitive and affective evaluations while in the clinical education program. Cognitive grades were averaged and affective points were totaled to obtain an overall score in each area.

The data collected for this descriptive study were ordinal in scale and could be ranked from high to low scores or grades. Data from the employer questionnaire were then compared to student grades and affective evaluations through use of Spearman rank-order correlation. The researcher hypothesized that there would be a relationship between the employer competency ratings and the affective evaluation scores of the medical technology students in the study group.

CHAPTER IV

PRESENTATION OF FINDINGS

The purpose of this chapter is to present the findings of the study. The sections are presented in the following order: (1) design of the study, (2) demographic information, (3) clinical education evaluation, (4) employer questionnaire response, (5) correlation of data, and (6) examination of the research hypothesis.

Design of the Study

The previous studies described in the review of literature led the researcher to question what relationship might be found between cognitive and affective measures of medical technology students, and graduate competence on the job as described by employers. In order to test the hypothesis that there is a relationship between employer competency ratings and affective evaluation scores, three relationships were measured. These were the relationships between:

1. Entrance grade point average and clinical grade point average.
2. Clinical grade point average and employer competency ratings.
3. Affective evaluation scores and employer competency ratings.

Demographic Information

The study group consisted of all students (N=16) in the 1985 and 1986 classes of the medical technology program. Thirteen members of

the group completed the 13 month clinical education program and were employed as medical technologist, MT (ASCP), in a clinical laboratory position. Three members of the study group could not be used in the correlation study. One student failed to complete the program for personal reasons. Another student left the United States and was not employed in a clinical laboratory. The third student was married after completing the program and is not yet employed. The group consisted of 11 female and five male students. Their ages ranged from 21 to 28. All students who completed the program passed the national certifying examination.

Clinical Education Measures

The data for measuring cognitive and affective clinical education were documents in the student's academic file. The academic file of each student in the program contained a completed application, college transcript, academic and non-academic references, clinical lecture grades, and evaluations of the student's technical and affective performance in eight laboratory sections. For the purpose of this study the following information was compiled: (1) entrance college grade point average, (2) clinical grade point average from 11 lecture classes, and (3) affective evaluation scores from the five major laboratory sections (Microbiology, Chemistry, Hematology, Immunohematology, and Immunology) that comprised 48 weeks of the clinical year.

Entrance Grade Point Average

The entrance grade point averages of the study group were computed from college transcripts. The mean average of the study group was 3.3 with a range of 2.6 to 4.0. Pre-entrance course work was completed at Central State University, Northeastern Oklahoma State University, Oklahoma State University, Southwestern Oklahoma University, the University of Oklahoma, and the University of Tulsa. The two students who were not currently working in a clinical laboratory (J, K) ranked in positions two and three with respect to entrance grade point average. The entrance grade point averages are presented in Table I.

Clinical Grade Point Average

The clinical grade point averages of the study group were calculated by the researcher from their course grades. During the clinical year each student completed 11 major lecture courses. The clinical grade point is calculated based on the number of contact hours for each course. The two students who were not currently working in a clinical laboratory (J, K) ranked in the lowest positions, one and two with respect to clinical grade point average. The clinical grade point averages are presented in Table I.

Affective Evaluation Scores

The affective evaluation scores were obtained from a standard evaluation instrument designed to assess five categories of student affective behavior: (1) professionalism, (2) human relations/interpersonal communication, (3) dependability, (4) initiative, and

TABLE I

CLINICAL EDUCATIONAL MEASURES
OF THE STUDY GROUP

Student	Entrance Grade Point Average	Clinical Grade Point Average	Clinical Affective Evaluation Scores
A	3.5	3.88	152
B	3.1	3.95	160
C	3.0	3.78	159
D	3.7	4.00	162
E	3.5	3.81	158
F	2.9	3.71	157
G	4.0	3.73	147
H	3.2	4.00	149
I	3.6	3.86	151
J**	2.7	3.34	148
K**	2.6	3.10	127
L	3.8	3.96	149
M*	3.8	----	---
N	3.9	3.78	157
O	2.5	3.40	144
P	2.9	3.55	158

* Student did not complete the program.
** Student not currently working in a clinical laboratory.

(5) quality of work (See Appendix A). Twenty-seven separate items were listed on the instrument. A three-point scale was used. Points were assigned to each item based on performance. If the student did not meet the established expectation, zero points were assigned. If the student met the expectation, one point was assigned. If the student met and exceeded the expectation, two points were assigned.

The student's final scores on the evaluation from each clinical section were added together to reflect a cumulative clinical affective evaluation score for the entire year. Student evaluation was performed by the clinical instructor working directly with the student in the laboratory. The clinical affective evaluation scores are also presented in Table I.

Employer Questionnaire Response

The graduate student employer questionnaire was mailed to the current employer of the 13 students from the study group who were working in a clinical laboratory (See Appendix B). All of these questionnaires were completed and returned. There were seven different employers identified by the graduates of the program.

The employer rated the student on each of the 15 job performance standards. The competency rating was obtained from the questionnaire returned by the employer. The employer was asked to indicate the current level of job performance of the employee by checking the appropriate standard: needs to improve, meets, or exceeds. The responses on the questionnaire were given values of zero, one, or two. A response of "needs to improve" was given a value of zero. A response of "meets" was given a value of one, and a response of "exceeds" was

given a value of two. The points were totaled from each questionnaire to reflect overall job performance. The highest total score that could be obtained was 30. The values ranged from ten to 20 with a mean of 15.5.

Comments were included on 11 questionnaires. All responses indicated that the employer was satisfied with the performance of the graduate. Three employers commented that the graduate had experienced difficulties adjusting to the work situation. These students (L, N, O) ranked at the low end of the rating scale in positions one, two, and three. The distribution of the scores is presented in Table II.

Correlation of Data

The Spearman rank-order correlation procedure was used to locate any relationship between student grade point averages, affective evaluation scores, and employer competency ratings. The correlation procedure was used to relate the student's entrance grade point average to the final grade point average. The procedure was also used to relate employer competency ratings to clinical grade point averages and affective learning scores of the same sample population. The Spearman rank-order coefficient (r_s) or rho is frequently employed to determine the degree of relationship between two ordinally measured variables. This non-parametric technique was the preferred method of analysis with a small n.

To compute r_s, rank was assigned to each subject to be compared. In tied scores the ranks were averaged. The following formula was used to computer r_s:

TABLE II

EMPLOYER COMPETENCY RATINGS
OF THE STUDY GROUP

Student	Total Score
A	16
B	20
C	17
D	18
E	15
F	17
G	16
H	14
I	15
J**	--
K**	--
L	10
M*	--
N	12
O	13
P	19

* Student did not complete the program.
** Student not currently working in a clinical laboratory.

$$r_s = 1 - \frac{6 \Sigma d^2}{n^3 - n}$$

where n = the number of subjects

Σd^2 = the sum of the squared differences between the subjects' ranks.

The relationship between entrance grade point averages and clinical grade point averages was calculated as a positive correlation ($r_s = +0.73$). The employer competency rating was found to be positively correlated with the affective evaluation scores of the study group ($r_s = +0.71$). There was no correlation between the employer competency rating and the clinical grade point average ($r_s = -0.05$). The results are summarized in Tables III and IV.

Examination of Research Hypothesis

The research hypothesis stated that there would be a relationship between employer competency ratings and affective evaluation scores of medical technology students. Utilizing the Spearman rank-order correlation coefficient, r_s, there was a correlation identified between the employer competency rating and the affective evaluation scores of the students in the study group. The research hypothesis was supported by the data collected in this study.

The researcher was interested in determining which measures could be used to predict professional success among medical technology students. The research design and statistical treatment enabled the researcher to correlate the data in a descriptive manner rather than make legitimate predictions and inferences to the general population. From this description, it was interesting to see that the grade point average did not correlate to competency on the job. Therefore, even

TABLE III

SPEARMAN RANK-ORDER CORRELATION,
GRADE POINT AVERAGES

Student	Entrance Grade Point Average	(Rank)	Clinical Grade Point Average	(Rank)
A	3.5	(9.5)	3.88	(11)
B	3.1	(7)	3.95	(12)
C	3.0	(6)	3.78	(7.5)
D	3.7	(11)	4.00	(14.5)
E	3.5	(9.5)	3.81	(9)
F	2.9	(4.5)	3.71	(5)
G	4.0	(15)	3.73	(6)
H	3.2	(8)	4.00	(14.5)
I	3.6	(11)	3.86	(10)
J**	2.7	(3)	3.34	(2)
K**	2.6	(2)	3.10	(1)
L	3.8	(13)	3.96	(13)
M*	3.8		---	
N	3.9	(14)	3.78	(7.5)
O	2.5	(1)	3.40	(3)
P	2.9	(4.5)	3.55	(4)

$\Sigma d^2 = 152$

$r_s = +0.73$

* Student did not complete the program.
** Student not currently employed in a clinical laboratory.

TABLE IV

SPEARMAN RANK-ORDER CORRELATION,
EMPLOYER COMPETENCY RATINGS

Student	Employer Competency Rating	(Rank)	Affective Evaluation Scores	(Rank)	Clinical Grade Point Average	(Rank)
A	16	(7.5)	152	(6)	3.88	(9)
B	20	(13)	160	(12)	3.95	(10)
C	17	(9.5)	159	(11)	3.78	(5.5)
D	18	(11)	162	(13)	4.00	(12.5)
E	15	(5.5)	158	(9.5)	3.81	(7)
F	17	(9.5)	157	(7.5)	3.71	(3)
G	16	(7.5)	147	(2)	3.73	(4)
H	14	(4)	149	(3.5)	4.00	(12.5)
I	15	(5.5)	151	(5)	3.86	(8)
J**	--		148		3.34	
K**	--		127		3.10	
L	10	(1)	149	(3.5)	3.96	(11)
M*	--					
N	12	(2)	157	(7.5)	3.78	(5.5)
O	13	(3)	144	(1)	3.40	(1)
P	19	(12)	158	(9.5)	3.55	(2)
				$\Sigma d^2 = 107$		$\Sigma d^2 = 385$
				$r_s = +0.71$		$r_s = -0.05$

* Student did not complete the program.
** Student not currently employed in a clinical laboratory.

through grade point averages are useful tools in predicting academic success, they do not appear to be useful predictors of professional success as defined by the employer

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The content of this chpater is divided into four parts. A summary is presented in the first part. This is followed by conclusions, implications for practice, and recommendations for future research.

Summary

The overall goal of a clinical education program is to provide broad educational experiences in medical laboratory testing by both didactic lecture and practical experience. It is also imperative to provide opportunities to develop throught processes essential to critical thinking and good judgment of a health care professional.

The profession dictates that the student should be adequately prepared to accept and fulfill the broad responsibilities of a medical technologist. Therefore, the program must also produce a graduate that meets employer's expectations if job placement and continued employment are to be satisfactory.

The clinical objectives used for evaluating baccalaureate medical technology students are predominantly written in the cognitive and psychomotor domains. The review of literature revealed that although the affective domain was considered to be important in instilling professional attitudes in students, objectives in this domain were lacking and evaluation was inconsistent.

The problem addressed in this study was to determine whether or not affective evaluation scores of medical technology students could be used as predictors of professional competency of graduates of a medical technology program. The literature noted that there is a discrepancy between what students acquire in their educational programs and what is expected of them in the real-life job market.

The purpose of this study was to determine if evidence of learning in the affective domain could be used to predict professional competency of medical technology graduates. The longitudinal study conducted in the institution demonstrated that affective learning outcomes as evaluated by clinical instructors were positively correlated to competency of graduates as rated by employers. This was determined by comparing grade point averages and affective evaluation scores of 13 students in the clinical education program and a survey of employers of the students following graduation. The data was collected between January, 1985 and October, 1987.

Conclusions

The conclusions that resulted from the study are as follows.

1. The student's entrance grade point average related to the student's clinical grade point average.

2. The student's clinical grade point average did not correlate with the graduate's professional competency.

3. The student's affective evaluation scores measured during clinical education did correlate with the graduate's professional competency.

Implications for Practice

An increased awareness of the role which affect plays in the development of a competent medical technologist is of interest to allied health educators as a group. Based upon these research findings, the following implications for practice are presented.

1. Affective behaviors need to be identified and defined in a clinical education program.

2. Instructional techniques that develop affective behavior should be incorporated into the educational process.

3. Affective learning outcomes should be evaluated throughout the program.

4. Affective learning scores may be used by the educators to assist in career counseling and job placement of the graduates.

5. Feedback from employers about graduate students can be used to improve the program.

6. Graduates of a clinical education program may be better prepared to adjust to work-world values if those values are incorporated into the educational process.

Recommendations for Future Research

Additional research is necessary to assist the medical technology educator in developing curriculum and maintaining an effective program. Listed below are some possible topics for future research.

1. Repeat the study with other similar groups of students.

2. Continue the longitudinal study over a longer time period to determine advancement in the field.

3. Conduct a study to evaluate the relationship of psychomotor objectives and outcomes to professional success.

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APPENDIXES

APPENDIX A

CLINICAL EVALUATION STUDENT

AFFECTIVE BEHAVIOR

PART III: EVALUATION OF STUDENT AFFECTIVE BEHAVIOR

STUDENT:_____

DEPARTMENT:_____

INSTRUCTIONS: Evaluate the student's affective behavior using the following criteria. Please cite examples, reasons or instances when performance is less satisfactory than the stated expectation or if the student exceeds the expectation.

PROGRESS REPORT should be completed mid-rotation so that the student has an opportunity to improve performance. Not applicable (N/A) may be indicated if there has been no opportunity to observe. No points are assigned; progress is indicated by a check mark in the appropriate column.

FINAL EXPECTATIONS will be completed following each clinical rotation. If the student does not meet the established expectation, circle 0. If the student meets the expectation circle 1. If the student meets and often exceeds the expectation, circle 2.

Transfer the total number of points to the final grade sheet.

DEFINITION OF EXPECTATIONS

DOES NOT MEET	Student does not consistently meet expectation or may meet only a part of the overall expectation. Requires some direction to achieve acceptable performance.
MEETS	Student meets expectation. Student performance is consistent and reliable.
EXCEEDS	Student meets expectation consistently. Performance actually exceeds expectation in many instances.

CRITERIA	DATE	PROGRESS REPORT		FINAL EXPECTATIONS		
		NEED TO IMPROVE	MEETS	DOES NOT MEET	MEETS	EXCEEDS
PROFESSIONALISM						
1. Exhibits confidence in abilities, consistent with present level of experience. COMMENTS:				0	1	2
2. Recognizes limitations and asks for guidance and/or assistance when necessary. COMMENTS:				0	1	2
3. Admits mistakes readily, takes steps to correct them, does not rationalize or blame others for the mistakes, and learns from them. COMMENTS:				0	1	2
4. Presents neat, clean appearance and complies with hospital and departmental dress code. COMMENTS:				0	1	2
5. Adheres to Laboratory policies, procedures and safety practices. COMMENTS:				0	1	2
HUMAN RELATIONS/COMMUNICATIONS/INTERPERSONAL RELATIONS						
1. Maintains considerate, caring and friendly attitude toward co-workers, health professionals, patients, and visitors. COMMENTS:				0	1	2

CRITERIA	DATE	PROGRESS REPORT		FINAL EXPECTATIONS		
		NEED TO IMPROVE	MEETS	DOES NOT MEET	MEETS	EXCEEDS
2. Expresses oneself effectively in written, verbal and/or non-verbal communications. COMMENTS:				0	1	2
3. Listens to and follows directions in a positive manner. COMMENTS:				0	1	2
4. Demonstrates willingness and the ability to work effectively with others. COMMENTS:				0	1	2
5. Accepts suggestions to improve performance and modifies behavior accordingly. COMMENTS:				0	1	2
QUALITY OF WORK 1. Demonstrates consistently the ability to produce quality work with acceptable accuracy. COMMENTS:				0	1	2
2. Organizes work for maximum efficiency and priority. (example: STAT, ASAP) COMMENTS:				0	1	2

CRITERIA	DATE	PROGRESS REPORT		FINAL EXPECTATIONS		
		NEED TO IMPROVE	MEETS	DOES NOT MEET	MEETS	EXCEEDS
3. Confirms identity of patient and/or specimen, and is able to determine if specimen is acceptable for analysis. COMMENTS:				0	1	2
4. Verifies abnormal results before reporting and is aware of normal results. COMMENTS:				0	1	2
5. Reports test results on patients accurately and legibly onto workcards and/or worklists. COMMENTS:				0	1	2
6. Utilizes computer properly to order tests, enter results, and obtain information. COMMENTS:				0	1	2
7. Demonstrates the ability to read and understand written procedures by following the printed instructions. COMMENTS:				0	1	2
8. Transfers information and/or work experience from one situation to another. (example: lecture to lab, department to department, procedure to procedure. COMMENTS:				0	1	2

CRITERIA	DATE	PROGRESS REPORT		FINAL EXPECTATIONS		
		NEED TO IMPROVE	MEETS	DOES NOT MEET	MEETS	EXCEEDS
9. Retains information and/or knows where to look for the information if forgotten. (example: procedures, supplies, results) COMMENTS:				0	1	2
DEPENDABILITY						
1. Arrives on time to the department at the beginning of the shift, and returns promptly from lunch, breaks and class. COMMENTS:				0	1	2
2. Notifies technologist when leaving for lunch, break, class, or other activities. COMMENTS:				0	1	2
3. Follows standard of attendance, notifies the department in case of absences, and requests vacation in advance. COMMENTS:				0	1	2
INITIATIVE						
1. Utilizes time effectively when work is complete, and looks for other tasks to do without being reminded. COMMENTS:				0	1	2
2. Leaves equipment and/or work area clean, neat and well stocked without being reminded. COMMENTS:				0	1	2

CRITERIA	DATE	PROGRESS REPORT		FINAL EXPECTATIONS		
		NEED TO IMPROVE	MEETS	DOES NOT MEET	MEETS	EXCEEDS
3. Offers assistance throughout the deparment as the situation dictates. COMMENTS:				0	1	2
4. Locates test results and/or specimens as needed and without assistance. COMMENTS:				0	1	2
5. Accepts responsibility for his/her duties and work area. COMMENTS:				0	1	2

APPENDIX B

GRADUATE STUDENT EMPLOYER

QUESTIONNAIRE

NAME OF EMPLOYEE:_____ CLASS:_____

LENGTH OF EMPLOYMENT:_____
Please indicate the current level of job performance by checking the appropriate standard.

	JOB EXPECTATIONS		
	NEEDS TO IMPROVE	MEETS	EXCEEDS
KNOWLEDGE			
1. Maintains current technical knowledge.			
2. Learns new procedures in reasonable time frame.			
3. Retains information and/or knows where to locate it.			
4. Applies knowledge to practical experience.			
5. Recognizes and resolves problems.			
TECHNICAL SKILLS			
1. Demonstrates the ability to produce quality work with acceptable accuracy.			
2. Organizes work for maximum efficiency and priority.			
3. Maintains a clean, organized work area.			
4. Follows quality control protocol and takes appropriate action.			
5. Maintains and operates equipment and instruments properly.			
PROFESSIONAL ATTITUDE			
1. Arrives at work on time, begins work promptly, and is available until end of shift.			
2. Maintains cooperative relationship with patients and staff.			
3. Demonstrates effective communication skills.			
4. Accepts suggestions to improve performance and modifies behavior accordingly.			
5. Accepts responsibility for self and is self-motivated.			

Are you satisfied with the performance of our graduate?

Additional comments or suggestions:

APPENDIX C

COVER LETTER

Dear Laboratory Director:

In an effort to improve our School of Medical Technology, we are contacting employers of our recent graduates and asking their assistance.

If you or some qualified member of your staff could take a few minutes to complete our questionnaire, we would be most appreciative. We hope the feedback will enable us to evaluate our program more effectively and better meet the needs of the employers of our students.

Enclosed is the evaluation form and a self-addressed envelope.

Thank you for your time and input. Please contact us if we can be of any further assistance to you.

Sincerely,

Marilynn Bartel, MT(ASCP)
Program Director
School of Medical Technology

Medical Director
School of Medical Technology

VITA 2

Marilynn Eileen Bartel

Candidate for the Degree of

Master of Science

Thesis: THE RELATIONSHIP BETWEEN EMPLOYER COMPETENCY RATINGS AND AFFECTIVE EVALUATION SCORES OF MEDICAL TECHNOLOGY STUDENTS

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