RADIOGRAPHY EDUCATION IN COMMUNITY COLLEGE: A STUDY OF FIRST-YEAR STUDENT ATTRITION AND RETENTION

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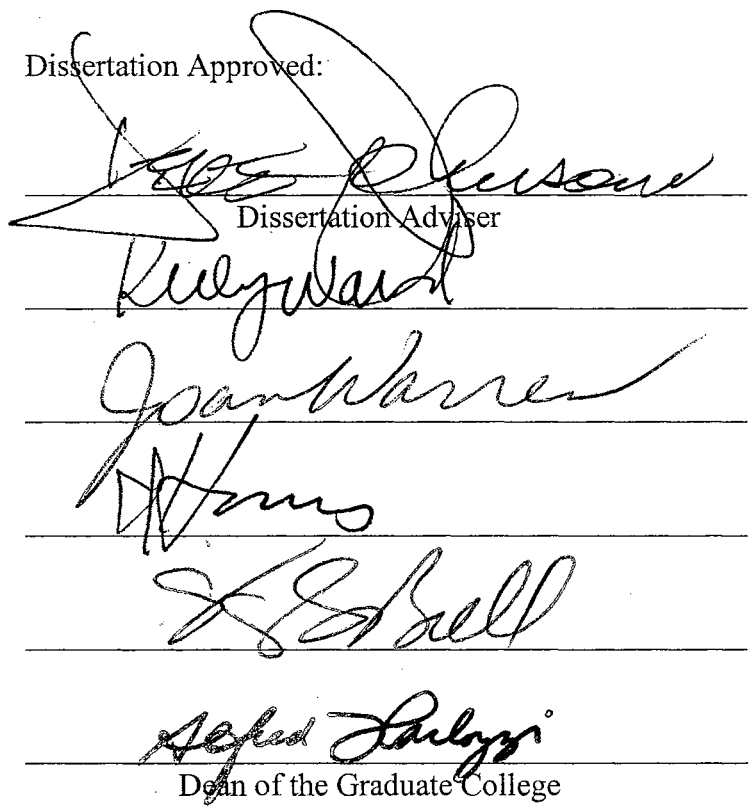

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I dedicate this research to my beloved parents, who raised me up to become a man imbibed with vision, faith, hope, love, and the pursuit of things worth living for.

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

The limited supply of allied health manpower is a major problem facing healthcare providers in the United States. The United States Bureau of Labor Statistic (BLS) projected that the demand for healthcare services in the United States will continue to increase over the next 50 years as a result of the increasing elderly population (NVCC, 2001). According to data published by the BLS, about 12,000 radiation therapists, 168,000 radiologic technologists (including sonographers), and 14,000 nuclear medicine technologists worked in the US in 1998. The BLS projected that by year 2008, the United States will need an additional 4,000 radiation therapists, 55,000 radiologic technologists, and 4,000 nuclear medicine technologists to fill positions that will become available in medical imaging (Sanchez, 2002).

A report by the American Hospital Association and The Lewin Group (2001) showed the existence of 18 % job vacancy rate for radiologic technologists, 11 % for registered nurses, 21 % for pharmacists, and high vacancy rates in other allied health professions. Hospitals and other healthcare providers have continued to experience increasing difficulties finding and recruiting health manpower to serve their community 's healthcare needs.

Radiography is an allied health profession that utilizes radiation-generating equipment to obtain images of the body's internal structures. These images containing

vital diagnostic information are read and interpreted by radiologists, medical doctors licensed to make diagnostic decisions concerning patients' health and conditions.

Presently, there is an acute shortage of radiographers in the United States. The radiography workforce is aging, and it is anticipated that in 10 years, the number of radiographers retiring from the profession will outnumber those entering the field (Chidley, 2000).

Background information provided by the American Society of Radiologic Technologists (ASRT, 2002) on the shortage crises identified four major underlying factors responsible for the shortage of Radiologic Technologists in the United States. These factors include the following: the increasing number of medical imaging procedures performed yearly in the United States; the aging US population and increasing number of patients; the aging radiologic technology workforce and increasing number of technologists reaching retirement age; and the decrease in the number of new entrants into the profession. According to the report, students are shunning the medical imaging profession and choosing careers in other fields perceived to be less stressful and more rewarding (ASRT, 2002).

An extensive literature search conducted at the beginning of this study revealed that no major national study has been published to accurately document a national attrition rate for students enrolled in radiography education. An enrollment study conducted by the American Society of Radiologic Technologists (2002) and also presented at a meeting of The Radiological Society of North America under the title "Workforce Crises: Strategies for Management" (Martino & Roy, 2001) estimated the national average

radiography student attrition rate to be 21.7% for 1999-2001.

Table 1 displays data from the American Society of Radiologic Technologists showing the decrease in the number of new entrants into the radiography profession over the past eight years (ASRT, 2002). This display is the number of people who took the radiography national certification examination in the United States between 1994 and 2001. Although year 2001 showed a slight upswing in the number of new entrants into the profession (probably as a result of increased recruitment and retention efforts), the number is still below the 1994 figure. The Radiography National Registry Examination is administered by The American Registry of Radiologic Technologists (ARRT), an organization that certifies and credentials radiographers in the United States.

Table 1

National Trends In Radiography Certification Examination

YEAR	CERTIFICANTS	YEAR	CERTIFICANTS
1994	10,629	**1998**	8,146
1995	10,330	**1999**	7,595
1996	9,427	**2000**	7,149
1997	8,691	**2001**	7,434

The population of the United States and the demand for radiology services continued to increase considerably since 1994, but the number of new entrants into the radiography profession continued to lag behind. The factors that may have precipitated this decline

include student attrition, enrollment decline or decrease in the number of prospective students, and closure of many certificate and hospital based radiography programs (JRCERT Annual Report, 2002).

The shortage of radiologic technology manpower is not limited to the United States; it has become a global problem (Keister, 2001). Many developed and developing countries are experiencing an acute shortage of cancer treatment personnel, x-ray, and ultrasound imaging personnel. The shortages and strategies for reducing them were issues discussed at a meeting of The International Society of Radiographers and Radiological Technologists (ISRRT, 2001).

Statement of the Problem

There is an acute shortage of radiographers in the United States. This shortage is the result of several factors, which include the following: student attrition, the decreasing number of new entrants into the profession, the aging US population, the increasing number of patients/radiological exams performed, and the aging radiography work force. It is anticipated that in 10 years, the number of radiographers retiring from the profession will outnumber those entering the field (Chidley, 2000). Student attrition is one of the major factors decreasing the supply of radiographers, and it contributes to the shortage of registered technologists. Martino & Roy (2001) reported a national average, radiography student attrition rate of 21.7% for 1999-2001. Discussion with the interim program director of the Community College under Study (CCUS) revealed that the radiography student attrition rate at CCUS highly exceeded the national average attrition rate of 21.7%.

Several intervention strategies have been proposed for combating the shortage of radiographers, but these would require long-term investments in material, financial, and human resources. An inexpensive intervention strategy that would help increase the supply of radiography manpower in the short and long run is for radiography programs to determine and address the factors that contribute to student attrition.

Prospective students are admitted into the professional phase of radiography program after completing required general education and basic science course requirements. The professional phase incorporates didactic and clinical sub-phases, which are presented five days a week and require a total of 24 months to complete. The program is stressful and time demanding (equivalent to holding a full-time job or working a 40-hour week without pay). Radiography program designs coordinate classroom lectures and simulation laboratories at college with laboratory and clinical experiences at affiliated clinical sites.

The first year of a radiography program's professional phase (especially the first semester) is a period of transition for the majority of students, most of whom have never had any professional contact or exposure to the health care or health services profession. This period marks the beginning of medical imaging knowledge/skill acquisition, patient contact, and professional development in radiography education. Didactic and clinical education experiences expose students to the nature of the radiography profession and the sacrifices one must make to successfully complete a radiography program and become certified to practice in the profession.

My experiences as a radiography student and a radiography educator over the past 15 years have precipitated certain assumptions with regards to student attrition in

radiography education. It is my assumption that as students interact with didactic faculty, clinical instructors, radiologists, patients, and other employees in the clinical/college environment, they become exposed to the realities of the profession. As didactic and clinical education rotations progress, relationships develop among the students and the didactic faculty, clinical instructors, radiologists, patients, and other employees in the clinical environment. As didactic and clinical education encounters intensify, the radiography professional picture becomes more real to students. Students become more aware of what it takes to work with the medical imaging team and patients and obtain radiographic images needed for diagnosis. They begin to realize in more detail the degree of academic and clinical involvement, as well as the sacrifices one must make to successfully complete a radiography program.

After periods of didactic and clinical education, some students drop out of the program as a result of one or a combination of the following factors: stress, diminished interest in the profession, academic problems, personal problems, and other factors. Although some students drop out of the program, other students persist, graduate, and become certified to practice in the radiography profession.

Research Questions

This study asked the following questions.

Focus question:

What is it like to be a first-year radiography student, and what factors contribute to student attrition and retention in radiography education?

Sub questions:

1. What factors inspire or influence prospective students to major in radiography?
2. What is it like to be a first-year radiography student during the initial and subsequent semesters of academic and clinical education rotation?
3. What academic, social, and other difficulties do radiography students experience during the first year of didactic and clinical education?
4. What is the nature of the interactions and relationships that develop during the first year among radiography students and among radiography students and didactic instructors, clinical instructors, radiologists, and other radiology department personnel?
5. What are the effects of the above interactions, relationships, and difficulties on didactic and clinical education (teaching and learning)?
6. What are the similarities and differences in the educational experiences of male, female, minority, and Caucasian radiography students during the first year of didactic and clinical education?
7. What are study participants' recommendations for improving the effectiveness of radiography education?

Purpose of the Study

The purpose of this study was to determine (from study participants' points of view) what it meant to be a first-year radiography student and the factors that contribute to student attrition/retention in radiography education. The study examined the clinical and academic difficulties and problems encountered by first-year radiography students. It also

examined the interactions and relationships that developed among radiography students, between radiography students and didactic faculty, clinical instructors, radiologists, and other radiology department personnel during the first year. The purpose was to determine the effects of these difficulties, problems, interactions, and relationships on didactic and clinical education (teaching and learning), student retention, and attrition during the first year of radiography education. This determination could enable radiography programs to find solutions to the educational pitfalls that may contribute to student attrition and other ineffective educational outcomes. An increase in student retention would increase the number of new entrants into the profession and help combat the shortage of registered technologists.

Significance on the Study

This study may add important contributions to theory, research, and practice in the field of radiography. The findings of this study may shed more light or add new contribution to the established theories of student attrition. It may also lead to the development of a new theory of student attrition peculiar to radiography and other allied health professions that incorporate didactic and clinical education activities in professional education. The study findings may enable researchers to develop a conceptual framework that may lead to the development of a theory that would help explain how didactic and clinical education interactions, relationships, and other factors influence the teaching and learning of radiography skills or contribute to student retention/attrition.

The findings and information from this study will be added to the limited knowledge base that presently exists in radiography in the following areas: student retention and attrition; radiography student experiences; and the effects of didactic and clinical education interactions and relationships on program effectiveness. The findings could enable radiography programs to find solutions to the didactic and clinical education pitfalls that may increase student attrition. This would enable radiography programs to increase student retention, the supply of radiographers, and combat the shortage of radiographers that exist in the field. All these would enhance practice in the radiography profession.

Methodological Framework

This study was conducted using qualitative case study methodology to determine what it is like to be a first-year radiography student and the factors that contribute to student attrition/retention. Data were gathered through personal interviews, focus group discussions, clinical observations, and program records from a purposeful sample of radiography students, clinical instructors, didactic instructors, clinical supervisors and administrators selected from CCUS and affiliated clinical sites.

A qualitative research methodology was used in this study as a result of the nature of the questions asked and in order to explore and present detailed views on the issues under study (Creswell, 1998). A qualitative methodology was used under the premise that truth exists in the form of multiple realities (Guba, 1990; Lincoln & Guba, 1985). Qualitative approach enables the researcher to investigate phenomena in their natural setting in order to determine study participants' perspectives and interpretations (Denzin & Lincoln,

1994). Qualitative studies employ postpositivistic approach, which accepts human values and perspectives as important considerations in the search for knowledge or truth. Postpositivistic approach is holistic and relies on the researcher as the major data-gathering instrument (Anderson, 1998).

Case studies involve the exploration of bounded systems (systems bounded by time and place) and could consist of a single case or multiple cases involving a program, an event, an activity, or individuals (Creswell, 1998). Radiography educational programs are systems bounded by time and place. In this study, a purposeful sample of radiography students, clinical instructors, didactic instructors, clinical supervisors, and administrators selected from CCUS and affiliated clinical sites were studied during the 2002-2003 academic year to determine perspectives on didactic and clinical education and factors that contribute to student attrition and retention.

Theoretical and Conceptual Framework

Theoretical or conceptual frameworks serve as a lens that enables the researcher to view phenomena under study. Bandura's (1977, 1986) Social Learning Theory, and Astin's (1984) Student Involvement Theory were used in this study to explain what it is like to be a radiography student and the factors that contribute to student attrition and retention during the first year of radiography professional education. These theories were used because instructor-student relationship, modeling behaviors, the teaching and learning environment and process, and student involvement are major factors that determine allied health profession educational effectiveness (Ford, 1978).

According to Bandura (1977),

> Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action. Because people can learn from example what to do, at least in approximate form, before performing any behavior, they are spared needless errors (p22).

Social learning theory (Meriam & Caffarella, 1999) asserts that people learn by observing others in a social setting, and that the teacher's role is to model and guide new roles and behaviors. Although imitation following observations reinforces learning, Bandura focused on the cognitive processes involved in observation. Four important processes influence observational learning. These are attention, retention (memory), behavioral rehearsal, and motivation. A model must be attended to before learning can occur. Bandura (1993) emphasized the learner's self-efficacy (learner's estimation of his or her level of competency), how it influences learning, and the effectiveness of one's interaction with others and with one's environment.

Astin (1975, 1984) enumerated the reasons that cause students to drop out from college and emphasized the effects of student involvement. The reasons students gave for dropping out of college include: boredom with courses, financial difficulties, family responsibilities, poor grades, dissatisfaction with requirements or regulations, change in career goals, inability to take desired courses or programs, good job offer, illness or accident, difficulty commuting to college, and disciplinary troubles. Astin's (1984)

Theory of Student Retention focuses on student's involvement, which he characterized as the quantity and quality of the psychological and physical energy a student invests in academia. Students' involvements are reflected by how much they participate in extracurricular activities, their interactions with faculty and campus personnel, and the magnitude of their involvement on academic work. According to Astin (1984), student involvement contributes positively towards retention while lack of involvement negatively impacts retention.

Definition of Terms

The following terms were defined using information taken from CCUS and other radiography program brochures, clinical instructors' handbooks, and personal experiences in the profession.

Radiographer - An allied health professional that utilizes radiation-generating equipment to obtain images of the body's internal structures that will assist in making medical diagnosis.

Clinical education – A term that refers to the education provided to students by certified radiography clinical instructors at affiliated hospitals and clinics.

Didactic education – Instruction provided at the college campus by the faculty in form of courses and laboratory simulations.

Effective radiography education – A radiography education that enables radiography students to acquire the required knowledge and skills that will help them to successfully complete a radiography program and become certified to practice in the profession.

Radiography clinical instructors – These are radiographers certified by the American Registry of Radiologic Technologists. These professionals are employed at affiliated hospitals or radiology clinics and contracted by radiography programs to teach, supervise, and evaluate students at affiliated hospitals and clinics.

American Registry of Radiologic Technologists (ARRT) – A credentialing organization that certifies qualified radiographer to practice in the profession.

Radiologic technology – An allied health, medical imaging and therapeutic profession that utilizes ionizing and non-ionizing radiation to treat diseases, and/or obtain images of the body's internal structures for diagnostic purposes.

Sonographer – A medical imaging professional who utilizes high frequency sound waves (ultrasound) to obtain diagnostic images of the body's internal structures.

Radiation therapist – An allied health professional who utilizes high-energy ionizing radiation and computerized equipment to treat diseases like cancer and tumor.

Nuclear medicine - An allied health, medical imaging profession that utilizes radio-pharmaceuticals (radioactive drugs) and computerized equipment to obtain diagnostic images of the body's internal structures and/or treat diseases.

CCUS – An acronym used as a pseudonym for the community college under study

Chapter one has presented the study background, the research problem, the research questions, the purpose, and the significance of the study. Chapter two presents a review of relevant research and literatures on the history and development of radiography; student retention and attrition; didactic/clinical education; admissions criteria and predictors of academic success, and an explanation of why this study was undertaken.

CHAPTER II

REVIEW OF RELATED LITERATURE

A comprehensive literature search revealed that very few studies have been done in radiography to determine what it is like to be a radiography student and the factors that may contribute to student attrition and retention. On the contrary, there are abundant literatures on clinical education in nursing and factors that may contribute to attrition and retention in other professions. Nursing and radiography belong in the allied health profession, and both have similar educational approaches, which incorporate didactic and clinical education components. In both fields, students rotate through affiliated clinical sites for clinical education during and/or after going through required didactic work and laboratory demonstrations and simulations at the college. As a result of the similarities in educational approaches and methodologies, studies on student attrition, retention, didactic/clinical education in nursing education may be relevant to radiography. Studies done in other fields on student retention and attrition may also be relevant to radiography. These studies were reviewed.

The literature review chapter is divided into four sections. These sections include: historical background on the development of radiography; student retention and attrition; didactic and clinical education; and admissions criteria/predictors of academic success.

Historical Background on the Development of Radiography Education

Radiography is an allied health profession that utilizes radiation-generating equipment to obtain diagnostic images of the body's internal structures. These images containing vital information are read and interpreted by radiologists, medical doctors licensed to make diagnostic decisions concerning patients' health and conditions.

X-ray was discovered by Wilhelm Roentgen on November 8, 1895, at Wurtzburg University in Germany (Bushong, 2001). This discovery ushered in a new era in the practice of medicine and led to the development of radiography and other medical imaging and therapeutic modalities.

About six months after x-ray was discovered, charlatans began to use the x-ray machines for commercial purposes in Europe and America. In those early years, x-ray machines were operated by professional photographers because radiographic imaging was regarded as a form of photography. Many people (out of curiosity) flocked to the Roentgen photography shops to view their bones, to see images and the internal structures of the human body (ASRT History, 2002).

In the 1900's independent businessmen, chemists, electricians, and engineers entered the x-ray business and started to operate the x-ray machines. Physicians sent their patients to these new operators for diagnostic and therapeutic work. By the 1910's many physicians began to install and operate the x-ray machines themselves, but as a result of time constraints and inability to keep up with increasing body of knowledge and technology in the field, physicians began to use their receptionists, secretaries, and office assistants as x-ray technicians. These technicians were under educated and over worked.

They learned radiographic procedures and radiation exposure techniques by the hunch method because instruction manuals were rare in those days. As a result of the poor radiation protection practices inherent in the profession back then, there was high death toll among these x-ray technicians (ASRT History, 2002).

By the 1920's, through the persistent work of Eddy C. Jerman (an equipment representative for the Victor X-ray Corporation) the plight of the undereducated and overworked x-ray technicians began to be addressed. Jerman's effort was instrumental to the innovations that started to occur in radiography education. He traveled far, preached the need for a unified concept of teaching radiographic imaging, and taught the importance of radiographic exposures.

As a result of Jerman's persistence, the Victor X-ray Corporation established a formal radiography educational program in 1917. Jerman's influence was also instrumental to the establishment of the American Association of Radiological Technicians, an association that provided avenues for technicians to communicate and interchange thoughts and ideas on radiologic techniques.

The technicians' society continued to evolve. The American Registry of X-ray Technicians was formed in 1923 for the purposes of establishing control over the education, testing and registering of x-ray technicians. It changed its name in 1930 to the American Society of Radiographers, then to the American Society of X-ray Technicians. The name was finally changed in 1964 to the American Society of Radiologic Technologists. This was done in order to distinguish a technician from a technologist, who is a well-educated and highly skilled professional (ASRT History, 2002).

In the 1950's, in order to promote and ensure quality in radiologic technology education, the American Society of Radiologic Technologists helped to establish uniform educational and accreditation standards for radiography programs. Progress continued to be made in ensuring quality education in radiography during the 60's, 70's, and the 80's.

In 1999, a core educational curriculum for medical imaging was developed by the American Society of Radiologic Technologists, in collaboration with the Association of Educators in Radiological Sciences, the Association of Collegiate educators in Radiological Sciences, the American Association of Medical Dosimetrists, the Medical Dosimetrist Certification Board, and the Society of Nuclear Medicine – Technologist Section. Also in 1999, the ASRT contracted the Educational Testing Service to conduct practice analysis surveys of radiologic technologists. The ASRT planned to use the results of these surveys to assess appropriate technologist educational levels and as a guide for future continuing education activities (ASRT History, 2002).

Today, radiography and medical imaging in general have entered a new frontier, brought about by technological evolution and innovations in medical and computer technology. The education and practice of radiologic technology has entered cyberspace. Teleradiology involves the use of computers and other electronic communication networks to transmit diagnostic images acquired at one location to another location for review and interpretation (Coons, 1995).

Today, radiography education is offered at the certificate, associate, baccalaureate, and masters degree levels. Educational organizations that offer programs in radiography include proprietary, career technological centers, technical colleges or institutes,

military/government, consortium, community colleges, four-year colleges, and universities (JRCERT, 2002).

Radiography programs are composed of didactic and clinical education phases that run concurrently with each other. Following lectures, laboratory simulations, and demonstrations at college radiography laboratories, students begin clinical education rotation at affiliated hospitals and clinics. Radiography clinical education rotations provide avenues for professional skill development and the integration of theory and practice. Students learn various radiographic techniques and procedures at school and clinical sites by observing laboratory simulations and demonstrations by didactic instructors and real life studies as clinical instructors perform similar medical imaging procedures on patients. Following these simulations, demonstrations, observations and some practice, students perform similar procedures on real patients, under clinical instructors' guidance and supervision, in order to demonstrate competency in radiologic procedures mandated by the American Registry of Radiologic Technologists (ARRT Radiography Competencies, 2000).

The American Registry of Radiologic Technologists (ARRT) requires radiography students to be enrolled in accredited radiologic technology programs, to complete required didactic coursework in specific content areas, and to demonstrate competency on specified list of clinical procedures before taking the primary certifying examination. The didactic and clinical competency requirements reflect the content areas of radiation protection, equipment operation and maintenance, image production and evaluation, radiographic procedures, and patient care (ARRT Radiography Competencies, 2000).

Student Retention and Attrition

An important issue facing higher education institutions in the US today is student attrition and retention. There are abundant literatures on this subject, and these give reasons and explanations why students persist or drop out from college.

The causes of student attrition, as outlined by Tinto (1987) include: problems adjusting to college or university life; academic difficulties and unwillingness to make academic commitments; lack of clearly defined goals; and uncertainty about career aspirations. Tinto stressed that an important feature of effective retention program include commitment to students, commitment to education, and clarity of educational missions. According to Tinto (1987), the climate inherent in the higher education institution plays a major role towards student retention, and that the secret to retention lies in the development of communities that are committed to education.

Thayer (2000) examined the decline in graduation rates that has been occurring in the United States colleges and universities over the years. The graduation rate in two-year colleges declined from 44.1 % in 1983 to 37.5 % in 1999. Among universities and four-year colleges, the graduation rate declined from 57.5 % in 1983 to 51.6 % in 1999. The author identified several factors that influenced or contributed to these declines. These factors included the booming US economy, which made several attractive jobs available, the rising college costs, and the eroding financial aid grant resources.

Thayer (2000) emphasized the retention of first generation students and students from low income backgrounds because these groups of students are among the least likely to be retained through degree completion. He recommended that institutions should pay

very special attention to first generation students and students from low-income backgrounds when designing strategies for student retention. Thayer also emphasized that retention strategies designed for the general student population will not be adequate for low income and first generation students. However, according to Thayer (2000), the strategies designed for low income and first generation students are likely to be successful for the general student population.

Szelenyi (2001) looked at the issue of minority student retention and academic achievement in community colleges. The focus was on ways to foster the retention and educational achievement of ethnic minority students enrolled in community colleges. A historical overview given by Szelenyi showed that in 1997, minority students received about 22.8 % of all associate degrees awarded in the US, and this represented a 7% increase from 1987. Although this represented a substantial increase, minorities still lagged behind and were under represented in associate degree attainment. According to the article, minorities tend to have lower persistence and lower academic preparedness for higher education.

Szelenyi (2001) emphasized that family and academic support factors play a major role in enhancing the academic achievement and success of minority students and that an association exists between cultural background and a student's preferred learning style. Among African American students, achievement was shown to positively relate to oral expression and interpersonal relationships.

According to Szelenyi (2001), a crucial element in efforts to raise student retention is the successful integration of students into the college institutional environment. The

paper emphasized that this integration into college environment can be achieved at community colleges through freshman seminars and mentoring programs. It also emphasized that the responsibility of college instructors is to create an enabling environment in which minority students can thrive and succeed. Colleges should provide for the diverse needs of their student populations and also facilitate the integration of minority students into the system (Szelenyi, 2001).

In a New England Student Success Study (O'Brian & Shedd, 2001) low-income and minority students enrolled in the region's four-year colleges were surveyed and interviewed. The areas of particular interest included pre-college preparation, financial aid, involvement at or feeling connected to the institution (social integration on campus), and attendance factors and behaviors. The study results indicated that low income and minority students faced many obstacles to success in college in form of financial, academic, and social barriers.

Key findings indicated that adequate pre-college preparation is essential to success in college, and that programs such as Federal TRIO and campus-sponsored programs are helping minority students succeed in college. About 90% of the students studied received some form of financial aid and their overall college attendance pattern did not suggest they were jeopardizing their ability to succeed in college. Low income students' involvement and attachment to their institution were moderate, and students who lived off-campus or attended from home tended to be older and enrolled as part-timers. The transfer rates for off-campus students were found to be higher than that for on-campus students (O'Brian & Shedd, 2001).

A report by the Oklahoma Higher Education Task Force on Student Retention (Feb. 2002) showed that a significant number of Oklahoma college students drop out of school during the freshman year. According to the report, about 10 % of freshmen at Oklahoma comprehensive universities and 21 % of freshmen at Oklahoma regional universities are not enrolled at any institution in Oklahoma the following year. This represents 10 and 21 % attrition rates respectively. For Oklahoma two-year colleges, the attrition rate was about 32.5 %. National data for comprehensive, regional, and two-year colleges were 20.0, 23.9, and 48.0 % attrition rates respectively (OK State Regents for Higher Education, 2002).

In the area of graduation, about 45 % of Oklahoma students at comprehensive universities and about 64.5 % of students at regional universities failed to graduate within six years of college attendance. Nationally the six years non-graduation rates were about 44.4 % for comprehensive universities and 56.4 % for regional universities, according to the Oklahoma State Regents for Higher Education report.

The major barriers to student retention identified by the Oklahoma Higher Education Task Force on Student Retention fit into five categories. These categories included financial; academic; social, emotional, and personal problems; future expectations/jobs; student services, enrollment, and advising.

Didactic/Clinical Education

Irby (1978) outlined the basic components and dimensions (scales) of effective teaching as determined by researchers through factor analysis and subjective examination of items. The scales unique to classroom instruction that were also common to clinical

teaching reflected the instructor's style of presentation, enthusiasm, and the instructor's knowledge and relationship with students. The scales unique to clinical education included the clinical instructor's knowledge and technical competence, clinical supervision of students, and modeling of professional standards and values.

An instructor's availability, accessibility, ability to evaluate and provide appropriate feedback to students, and his or her attitude towards students, affect students' motivation and the development of clinical competencies (Irby, 1978). Clinical competence, as described by Irby (1986), is the process of applying didactic information to clinical experience.

Daniels & DeVos (1996) conducted a national survey of 282 students enrolled in 61 radiation therapy programs in 28 states to determine students' expectations of their clinical instructors. The results of the survey indicated that among first, second, and third-year students, the most common expectation was that clinical instructors should take time in answering their questions and in explaining procedures. The predominant expectation cited by fourth-year students was that the clinical instructor should model professionalism. The phrase "model professionalism" is ambiguous and was not defined or explained by the author. There could be many interpretations of what modeling professional behavior meant.

A quantitative study by Moreno, White, Flores, and Riethmayer (2001) examined the perceptions of radiography students regarding mistreatments they received during the clinical portion of their education. The sample used in this study (199 students) was drawn from a population consisting of all first and second-year students (N = 224)

enrolled in seven associate degree programs in Texas, accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT). The students were asked to identify the types of mistreatment to which they were subjected and the perpetrators (program faculty, clinical instructor, clinical supervisor, staff technologist, radiologist, and other).

The study results, obtained through various statistical analysis, indicated that, while majority of the students studied perceived mistreatments, second year students were four times more likely to perceive mistreatment than first-year students. The mistreatments were mostly verbal abuse, and they came primarily from staff technologists, followed by radiologists, clinical instructors, clinical supervisor, program faculty, and other. According to the authors, this study suggested that the longer a student was in a radiography program, the greater would be the probability of perceiving mistreatment. The respondents gave several suggestions for preventing clinical mistreatments (Moreno, White, Flores, & Riethmayer, 2001).

Although Moreno, White, Flores, & Riethmayer (2001) documented high prevalence of clinical mistreatment among the students studied, there was no information on why the mistreatments occurred or the factors or incidents that precipitated them. Information was not given on the nature of the clinical teaching and learning environments or relationships that developed among the players after the mistreatments occurred. The provision of such detailed information on the nature of the clinical teaching and learning environments or relationships that developed among the players after the mistreatments occurred would require the use of qualitative research methodology. Qualitative research

methodology provides avenues for voices to be heard, for respondents to describe in their own words what transpired and how the incidents, and the environment and relationships that resulted afterwards, affected clinical teaching and learning.

A case study of 20 nursing staff and 40 students in clinical practice (Atack, Comacu, Kenny, LaBelle, & Miller, 2000) revealed that close student-staff relationships is a key component in the clinical education of nurses. It was also shown that the workplace environment, the characteristics of the nursing staff, and role perception were important factors that influenced student-staff relationships and learning.

Nahas, Nour, & al-Nobani (1999) reported that the quality of student-teacher interaction in the clinical field could facilitate or hinder student's learning in the clinical area. In this study of Jordanian nursing students' perceptions of effective clinical teacher characteristics, the authors showed that, overall, the students rated the clinical teacher's professional competence as the most important characteristic.

No significant difference was found between male and female students' perceptions; however, the clinical teacher's relationship with students was rated as the most important characteristic by third-year students while fourth-year students rated the clinical instructor's personal qualities the most important characteristics. The study results were congruent with the students' level of education, their cultural beliefs, and their values regarding education (Nahas, Nour, & al-Nobani, 1999).

Pauckert and Richard (2000) looked at medical students and residents descriptions of the roles and characteristics of their influential clinical teachers. Research results revealed that the students ranked characteristics of the teacher role highest while the

residents ranked the characteristics of the supervisory role highest. The study results showed that as learners develop professionally, their perceptions of the value of their teacher's behavior change. This, according to the authors, corroborated Stritter's learning vector theory.

Laurent and Weidner (2001) compared athletic training students' and clinical instructors' perceptions with regards to the most and least helpful clinical instructor characteristics. Analysis of the data obtained through questionnaires revealed that both the clinical instructors and the students identified "modeling professional behavior" as the most helpful and "integration of knowledge and research into clinical education" as the least helpful clinical instructor characteristics. The teaching tips developed, as a result of the findings, encouraged clinical instructors to demonstrate respect for students, display confidence, and demonstrate skills for students (Laurent & Weidner 2001).

Schuchert (1998) explored the relationship between graduating medical students' self-reported experiences of verbal abuse during medical school and their confidence in their clinical skills. The study results indicated that there was a significant relationship between verbal abuse and lower levels of confidence for all demographic groups of students. The result was also true for students with high and low abilities and high and low levels of assuredness. These results were not proof of causation but showed that there was a correlation between verbal abuse of students and the development of lower levels of confidence in clinical skills. Students subjected to much verbal abuse appeared to have lower levels of confidence in clinical skills than those subjected to little, or no, verbal abuse (Schuchert, 1998).

Cameron (1998) surveyed nurses at a 400-bed acute care hospital to determine the incidence of verbal abuse. The results of this survey showed that 85% of the 151 nurses that responded reported that they had experienced verbal abuse. As many as 45% reported experiencing verbal abuse within the past 15 working days. Many of the abuses came from patients and families. Since radiography students are involved in the process of clinical skill development, their probability of making mistakes during procedures may be higher when compared to certified radiographers. As a result, it is very likely that radiography students involved in clinical education could easily be subjected to verbal abuse from some patients and families at affiliated hospitals and clinics.

Admissions Criteria and Predictors of Academic Success

The characteristics of students in the health related professions and the criteria educators should use in selecting prospective students have been investigated extensively since the 1960's. McCaulley (1974) used the Myers-Briggs Type Indicator to compare the behavioral characteristics of nursing and physical therapy students with that of occupational therapy and medical technology students. The results of the comparison indicated that nursing and physical therapy students were the sociable and patient friendly types while occupational therapy and medical technology students were of the intuitive-feeling types. Although high school and undergraduate grade point average (GPA) were shown to be good predictors of future academic achievements, no measure was shown to effectively predict clinical performance (Ford & Morgan, 1978).

Ford and Morgan (1978) noted that the best selection criterion was probably a student's realistic desire to enter a field. It was pointed out that early introduction of

students to the clinical situations and immediate involvement in patient care situations was very beneficial because these early clinical experiences stimulated many students. Early clinical experiences, according to Ford and Morgan (1978), provide indications of student motivation and clinical abilities and could enable the student to discover early in the program whether he/she was going to be successful in the health profession.

The relationship between standardized tests and success in college has also been studied extensively. In a study involving undergraduate students at Oregon State University (Murtaugh, Burns, & Schuster, 1999), student attrition was shown to decrease with higher high school and first quarter grades and shown to increase with age and nonresident status. Pike and Saupe (2002) also documented that test scores, performance in high school, and college courses taken in high school were significantly related to freshman grade point average and explained approximately one third of the variance in first year grade point average.

Summary

This section has reviewed relevant literature related to the development of radiography; student retention and attrition; didactic/clinical education; and admissions criteria and predictors of academic success. Although the review revealed abundant literatures in nursing education and other disciplines, little work has been done in radiologic technology (radiography) to determine perceptions of what it is like to be a first-year radiography student and the factors that contribute to attrition and retention. The review documented the components and dimensions of effective didactic and clinical teaching, and the factors that increase or decrease educational effectiveness (Irby, 1978;

Daniels & DeVos, 1996; Moreno, White, Flores, & Riethmayer, 2001; Atack, Comacu, Kenny, LaBelle, & Miller, 2000; Nahas, Nour, & al-Nobani, 1999; Pauckert & Richard, 2000; Scuckert, 1998;). The review also documented the factors used as admissions criteria and predictors of academic success. The two studies done in radiologic technology relevant to my research used quantitative methodologies to determine students' expectations of their clinical instructors (Daniels & DeVos, 1996) and student perceptions of clinical mistreatment (Moreno, White, Flores, & Riethmayer, 2001).

Lacking in the literature are studies utilizing qualitative methodology to tell respondents' stories of what it is like to be a first-year radiography student, as the student embarked on a journey of academic and professional development and behavioral metamorphosis (the transition from prospective radiography students to professional radiography caregivers). Using qualitative case study methodology, this study intended to provide avenues for voices to be heard, for students to provide a detailed description of their experiences as first-year radiography students. The voices of students that persisted and those that dropped out of the radiography program at CCUS during the study period will be heard, as they describe their experiences and explain why they decided to persist or drop out of the program. The voices of other research participants will also be heard as they describe their experiences working with first-year radiography students.

Chapter III discuses the methodology and methods used to conduct this study. It explains why the qualitative research design was used and also discusses why multiple data sources were used to obtain the body of evidence necessary for understanding the phenomena under investigation.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

This chapter restates the focus and sub-questions being asked in this study and also describes the methodology and methods used to conduct the study. It explains why a qualitative case study methodology was employed and the criteria used for selecting the study site, the study population, and study sample. The chapter describes the methods used for data collection, the basis for developing the protocols used for data collection, and how the trustworthiness of the study was established.

Research Questions

This study asked the following questions:

Focus question:

What is it like to be a first-year radiography student, and what factors contribute to student attrition and retention in radiography education?

Sub questions:

1. What factors inspire or influence prospective students to major in radiography?
2. What is it like to be a first-year radiography student during the initial and subsequent semesters of academic and clinical education rotation?
3. What academic, social, and other difficulties do radiography student's experience during the first year of didactic and clinical education?
4. What is the nature of the interactions and relationships that develop during the first year among radiography students and between radiography students and didactic

instructors, clinical instructors, radiologists, and other radiology department personnel?

5. What are the effects of the above interactions, relationships, and difficulties on didactic and clinical education (teaching and learning)?
6. What are the similarities and differences in the educational experiences of male, female, minority, and Caucasian radiography students during the first year of didactic and clinical education?
7. What are study participants' recommendations for improving the effectiveness of radiography education?

Qualitative Research

The nature of the questions asked in this study called for the use of qualitative research methodology to answer them. An important premise of qualitative research is that truth exists in the form of multiple realities (Guba, 1990; Lincoln & Guba, 1985). A qualitative approach enables the researcher to investigate phenomena in their natural setting, in order to determine the perspectives and interpretations of study participants (Denzin & Lincoln, 1994).

Qualitative studies employ a post-positivistic approach, which accepts human values and perspectives as important considerations in the search for knowledge or truth. The post-positivistic approach is holistic and relies on the researcher as the major data-gathering instrument. (Anderson, 1998).

According to Miles & Huberman (1994), conducting qualitative research requires an intense and prolonged contact with a "field" or life situation, and the researcher's role is

to gain a holistic overview of the context being studied. Qualitative research involves capturing data on perceptions of local actors, and the process calls for deep attentiveness, empathetic understanding, and suspending or bracketing any preconceptions about the issue under study. Qualitative research is a form of naturalistic inquiry, and the main tasks involved is to "explicate the ways people in particular settings come to understand, account for, take action, and otherwise manage their day-to-day situations" (Miles & Huberman, 1994, p. 6-7).

In a naturalistic study, the researcher, through personal observations and interviews, seeks to provide a rich, dense, detailed, and reflexive account of the situation under study. The purpose is to bring out the meanings or interpretations of the people that inhabit the setting (Denzin & Lincoln, 1994).

According to Guba (1990), reality can never be comprehended fully; but it can only be approximated. In qualitative research, most analysis is done using words, and these are organized in ways that enable the researcher to be able to compare, contrast, analyze, and bestow patterns (Miles & Huberman, 1994). All of the above constitute the reasons why a qualitative approach was employed in this study.

Case Study Research

This study was conducted using the explanatory case study method (Yin, 1984) in order to understand and interpret observations and perceptions of radiography educational phenomena (Merriam, 1988). The explanatory case study method enabled the researcher to answer the "how" and "why" questions in order to determine (from the respondents points of view) what it is like to be a first-year radiography student and the factors that

contribute to student retention and attrition in radiography.

Case studies involve the exploration of bounded systems, systems bounded by time and place. Case studies could consist of a single case or multiple cases involving a program, an event, an activity, or individuals (Creswell, 1998). The study of a radiography educational program to determine respondents' perspectives on education fits the definition of case study because radiography educational programs are systems bounded by time and place.

The majority of case study research is interpretive and concerned with the how and why things happen. The sources of evidence typically used in case studies include: physical artifacts; documentations such as letters, newspaper and other articles, memoranda, agendas, previous studies; file data; interviews; site visits; direct observation; and participant observation (Anderson, 1998). These sources (when applicable) were utilized in this study to determine respondents' perspectives on radiography education, student retention, and attrition.

Study Site

A state owned community college located in southwestern United States, which offers an associate degree program in radiography, was used for this study. Discussion with the radiography interim program director of the Community College Under Study (CCUS) in the spring of 2002, before this study was designed, revealed that for several years, the radiography program at CCUS has experienced high rates of student attrition among first-year students. This discussion sparked my interest in researching radiography education at the community college level. I decided to look at student attrition, retention,

and what it is like to be a first-year radiography student. I expressed interest in using CCUS radiography program for a case study on student attrition and retention, and after further discussions with the radiography program director and the associate dean of health sciences division, I was given the green light to proceed.

Following the approval of my dissertation proposal and institutional review board (IRB) application, I submitted a formal written request to CCUS and three affiliated clinical sites asking for permission to use the radiography program and clinical sites for a case study on student attrition and retention. I traveled to CCUS in the fall of 2002 and spoke to the radiography faculty and students. I explained the purpose of my research and invited them to participate in the study. The radiography faculty and students agreed to participate in the study, and after reading and signing the consent forms, data gathering began during the second half of fall 2002 and was completed during the summer of 2003.

Study Population and Sample Selection

The study population was made up of the following individuals: radiography students enrolled at CCUS during the study period; all students who dropped out in their first year from CCUS, between 1999 and 2002; clinical instructors, clinical supervisors and administrators working with radiography students at affiliated clinical sites; radiography program director; and didactic instructors teaching radiography at CCUS during the study period. The total number of subjects in the population was approximately 104, and all were over 18 year old.

The sample selected for the case study included 13 first-year radiography students who volunteered to participate in the study. These students were included to provide

current information on what it was like to be a first-year radiography student at CCUS and affiliated clinical sites. The first-year students who volunteered to participate in the study (13 out of 19 first-year students) reflected the ethnicity, gender, and cultural diversity inherent in the 2002-2003, first-year, student population. Four of the 13 students later dropped out of the radiography program at the end of spring 2003. The four students were the only ones who dropped out from the class admitted in 2002, and they were interviewed before and after they dropped out.

A convenient, purposeful sample of five readmitted students, who dropped out of CCUS radiography program in year 2000, prior to the beginning of the study, were also included in the study sample. These five students dropped out of CCUS' radiography program (in their first-year) during the administration of the former radiography director when attrition rates at CCUS were extremely high. The five were later readmitted into the program during the time of the interim radiography program director, in the spring of 2002. The group of five repeated and passed the courses they had failed in their original first year and began their second year in the fall of 2002, when the current radiography program director took over the CCUS radiography directorship.

The readmitted group of five students (two males and three females) constituted a special, convenient-purposeful sub-sample because of their didactic/clinical encounters and experiences during the period of the former radiography director, the interim director, and the new director. They were selected to participate in the study because their association with and experiences during the three administrative periods could provide the crucial information needed to enable the researcher to determine the factors that may

have contributed to high student attrition rates at CCUS.

The rest of the individuals included in the study sample were the following: four clinical instructors selected from two clinical sites (two from each site) as a result of their extensive experiences working with students over the past 15 years; three clinical supervisors/administrators selected also from the two clinical sites because of their long years of experiences in the field; the CCUS radiography program director; and two CCUS radiography didactic instructors. The total number of subjects who participated in the study (in individual and focus group interviews) was 28. These included 18 students, three didactic instructors, and seven clinical personnel. Table two below shows the number and category of subjects who participated in the individual and focus group interviews and discussions.

Methods Used for Data Collection

Case studies rely heavily on the use of multiple sources of data to obtain the body of evidence necessary for understanding the phenomena under investigation. The seven sources of data typically used in conducting case studies include documentation, file data, interviews, site visits, direct/participant observation, and physical artifacts (Anderson, 1998). This study used several data sources to obtain information used to answer the research questions. These sources included: individual interviews; focus group interviews/discussions; clinical site visits and participant observations of didactic/clinical education activities and interactions at CCUS and affiliated clinical sites; and file data or program records containing information on student attrition.

The purpose of using individual or personal interviews was to give students the

atmosphere and opportunity to voice their perspectives and opinions without being intimidated by their peers during group discussions. Focus group interviews and discussions have the advantage of eliciting rich information as a result of the interactions among the interviewees. Focus groups are also useful in cases where individuals involved in personal interviews may be reluctant or unwilling to provide needed information (Creswell, 1998). On the other hand, an individual may be intimidated by his/her peers during a group discussion and may be hesitant to provide information. Such an individual may be willing to provide information during a one on one interview. The use of multiple data sources and methods provided the corroborative evidence often referred to as triangulation (Miles & Huberman, 1994; Merriam, 1988; Lincoln & Guba, 1985; Creswell, 1998).

Individual and Focus Group Interviews

The study conducted a total of 23 individual interviews and two focus group interviews with five study participants (see Table 2 for details). The participants who took part in the individual and focus group interviews conducted during spring and summer of 2003 included four first-year students who dropped out during the study period; five readmitted former first-year dropouts; nine first-year students who volunteered to participate in the study; four clinical instructors; three clinical supervisors/ administrators; and three CCUS radiography faculty members. The CCUS radiography program faculty members included the program director, the clinical coordinator, and a didactic instructor. The first focus group interviews/discussions involved three students while the second involved only two students because one student failed to attend.

Table 2

Participation in Individual and Focus Group Interviews

ID #	Gender/Category	Interview Type	ID #	Gender/Category	Interview Type
1	MS	II	15	MS	II
2	FS	II	16	FS	FGI
3	FS	II	17	FS	FGI
4	FS	II	18	FS	II
5	FS	II	19	FPD	II
6	FS	II	20	FDI	II
7	MS	II	21	FDI	II
8	FS	II	22	FRD	II
9	FS	II	23	FCS	II
10	FS	FGI	24	FCI	II
11	FS	FGI	25	FRD	II
12	MS	FGI	26	FCI	II
13	FS	II	27	MCI	II
14	MS	II	28	FCI	II

Male Student (MS); Female Student (FS); Individual Interview (II); Focus Group Interview (FGI); Female Program Director (FPD); Female Didactic Instructor (FDI); Female Radiology Director (FRD); Female Clinical Supervisor (FCS); Female Clinical Instructor (FCI); Male Clinical Instructor (MCI).

Quiet locations free of distraction were used to conduct the interviews, and the procedures recommended for conducting interviews (Creswell, 1998) were followed. The radiography laboratory was used to conduct all individual and focus group interviews involving students, but the radiography program director and the didactic instructors' interviews were conducted in their individual offices. The interviews involving clinical personnel were conducted in a quiet location at the clinical sites while the second interviews involving students who dropped out after the study began were conducted over the phone. Permission to tape record the interview sessions was sought from respondents before the interview began, and limited notes and remarks were taken or made during the interviews. Probe questions were used to clarify, delineate, or bring out needed explanations on issues under discussion. Samples of the interview protocols used for the study are included in the Appendix.

Two transcript review sessions were held in summer, 2003 with interviewed first-year students and readmitted dropout students respectively at the CCUS radiography lecture room to enable students review their individual and focus group interview transcripts for accuracy. These review sessions lasted approximately 20 minutes. Some students mainly reviewed their transcripts for accuracy and left while others stayed back and reiterated the points recorded in their interview transcripts. The other study participants were also given the opportunity to review their interview transcripts for accuracy.

Basis for Developing the Individual and Focus Group Interview Questions

The development of the individual and focus group interview questions was based on the following criteria: the purpose and objective of the study, the nature of the research questions asked, the nature of the clinical and didactic educational processes or methods used in radiography education, and personal thoughts. The interview protocols were semi-structured and the questions were open-ended to give respondents the opportunity to speak freely and give rich and detailed accounts of their perspectives and experiences. Funneling technique was used to develop the questions, moving from general to specific questions, because this technique helps to develop logical and progressive responses (Anderson, 1998).

The first two questions in the interview protocols were designed to provide background information and also enable the respondent to relax and become comfortable with the interview and recording process. Questions number three through the end were designed to enable respondents to progressively provide responses that would enable the researcher to determine the impact of clinical/didactic interactions, relationships, and other factors on retention, attrition and the effectiveness of first-year radiography education. Thus, the protocol questions were designed to provide answers to the sub questions, which elicited answers to the focus question, "What is it like to be a first-year radiography student, and what factors contribute to student attrition and retention in radiography education?"

The individual and focus group questions were pilot tested for refinement purposes with a purposeful sample of first-year radiography students from another radiography

program, and didactic/clinical instructors from another clinical site located in the same state as the community college under study. The pilot test consisted of four individual and one focus group interviews. The individual interviews were conducted with two first-year radiography students, one didactic instructor, and one clinical instructor while the focus group interview was conducted with three first-year radiography students. Pilot testing the interview questions helped identify ambiguities, clarified wordings, validated the flow and the physical utility of the protocol, and also helped determine the adequacy of the recording arrangement (Anderson, 1998).

Participant Observation and Clinical Instructors' Interviews

Clinical site visits and participant observations were also conducted during the study. I visited four clinical sites affiliated with CCUS and spent two days at each clinical site observing clinical education activities, clinical instructor-student interactions, and interactions among students and other clinical personnel. Care was taken during clinical observations not to disturb ongoing diagnostic imaging procedures and student-personnel interactions.

Field notes were taken between observations, and summary notes were written at the end of each observation day. Following the end of participant observations, I went back to the clinical sites and interviewed selected clinical instructors, clinical supervisors, and radiology department directors and assistant directors to get their perspectives on clinical education and suggestions for improving clinical teaching and learning.

Other Data Source

File data and program records containing information on admissions, student attrition, and retention at CCUS was used to gather relevant information that enabled the researcher to construct a matrix display (Table VII) showing a historical overview of first-year student admissions, student attrition, attrition rates, attrition reasons, and attrition rates by reasons between 1997 and 2003.

Data Analysis

Data gathered from the various sources mentioned above were analyzed as they were collected. According to Merriam (1988), a researcher engaged in a qualitative study may not know whom to interview, what questions to ask, or where to look next without analyzing data as they are being collected. The interview transcripts and field notes were read extensively as they emerged because this was necessary for good analysis and understanding of the issues and situation under study.

The interview transcripts were coded for themes using the inductive coding technique (Strauss & Corbin, 1990). The themes discussed in chapter four of this study were not developed prior to conducting the study, but they emerged as the data were being analyzed. The field notes and write-ups made after each field contact, including the observation and contact summary sheets developed from clinical visits were analyzed to delineate emerging themes and main points. The emerging themes from the coded interview transcripts and field note summaries were put in bins, and the bins were used to construct tree diagrams and folk taxonomy (a hierarchical tree diagram) to enable the researcher to delineate common themes, themes unique to respondents, and classify

important phenomena (Miles & Huberman, 1994). The emerging themes were used to organize respondents' main points, and these were displayed in data matrixes as summaries and for contrasts and comparative purposes.

In general, the analysis involved coding, counting frequencies of codes, writing memos, noting patterns and themes, clustering and conceptualizing, subsuming particulars into the general, making metaphors, factoring, noting relations among variables, and building logical chains of evidence (Miles & Huberman, 1994). The findings that emerged from the analysis were examined under the lenses of the surveyed literatures and theoretical frames of Bandura's (1977) Social Learning Theory and Astin's (1984) Student Involvement Theory to see how they related or differed.

Research Trustworthiness

A researcher has to ensure that the findings of his/her research are trustworthy in order to build confidence in the readers. This brings up the issue of validity. Credibility, transferability, dependability, and confirmability are the naturalistic equivalent terms for internal validity, external validity, reliability, and objectivity respectively (Lincoln & Guba, 1985). According to Miles & Huberman (1994), in testing and confirming findings, the quality of research data can be assessed by doing the following:

1. Getting feedback from informants during data collection, or by giving them a summary of the research findings and conclusions drawn to verify. This was done in my study. Study participants were given the summary of their individual and focus group interviews and research findings to read and verify for accuracy.
2. Checking for representativeness: This involves asking the following questions:

Were non-representative informants used for the study? Were inferences drawn from non-representative processes, and were generalizations made from non-representative events or activities? A purposeful and representative sample was used in this study, and inferences were drawn from representative processes. The purpose of this research was not to make generalizations but for respondents' voices to be heard as they shared individual experiences and perspectives on didactic and clinical education, student attrition, and retention during the first year of radiography education at CCUS and affiliated clinical sites.

3. Checking for researcher effects: Researcher effects may involve inflating the potential problem, not spending enough time in the field, not keeping research questions firmly in mind, following alluring leads, and influencing informants or being influence by them. The researcher spent enough time in the field and focused on the research questions during the study. He exercised objectivity and did not follow alluring leads, influence informants or allow informants to influence him during the study.
4. Triangulation: Using several data sources and methods (interviews, observations, document analysis). These data sources were used in the study.
5. Weighting the evidence: This basically refers to the quality of data collected. Miles & Huberman (1994) advocated that making marginal remarks on field notes and summarizing views on data quality are good methods one could use to identify and also inform the readers about the quality of data collected. These were done during data collection and analysis. The interviews yielded high

quality data. Respondents spoke freely and shared their views and perspectives without any fear or intimidation. The recording system was also of high quality with high signal to noise ratio. The interview transcripts used for analysis were of very high quality and represented the actual words and expressions shared by respondents.

6. Checking the meaning of outliers: Respondents' perspectives or findings that did not fit the general scheme of things were not ignored. They were verified further by checking with respondents or sources of the information for meaning and further clarifications.
7. Using extreme cases: This could help verify or confirm conclusions. It is another way of weighting evidence and was done during the study.
8. Following up surprises: All surprises that emerged from data analysis were not ignored but were investigated further by interviewing the sources and others.
9. Looking for negative evidence or rival explanation: This was done in order to look for any inconsistency with conclusions drawn from the analysis or to find any data opposed to the conclusion. It was another way of looking for outliers.
10. Making "if-then tests" enables the researcher to formalize prepositions. Miles & Huberman (1994) stated that predictions can be made by linking large number of "if's" to a single major "then". If-then tests were conducted as data accumulated during analysis to formalize prepositions, not necessarily for predictions.
11. Ruling out spurious relations among variables: This helps to establish the most likely relations that exist among variables. This was done during analysis.

12. Replicating findings through triangulation from many data sources: This was built into the study.

Miles & Huberman (1994) gives standards for establishing the quality of conclusions. These standards were employed in order to establish the trustworthiness of research findings. Several actions were taken on each aspect of trustworthiness: comfirmability, dependability, credibility, and transferability.

Confirmability

The methods and procedures used for data collection were described explicitly and in detail so that the actual sequence of data collection could be followed as an audit trail. As a result of my association with and experiences in the radiography profession, my assumptions, values, and biases concerning radiography education had the potential to influence this study. In spite of my close involvement with the topic, I worked hard to maintain a neutral stance and provide fair representation of data.

Dependability

I ensured consistency in the research process by making sure that interview questions were clear and not ambiguous, and that they were asked in the same manner during all the interviews. The same setting was used for similar interviews conducted. Coding checks were made to ensure consistency.

Credibility

This ensures that the study findings make sense and are credible to both study participants and the readers. A comprehensive account of the information gathered from the various data sources used was given to depict accurately what the respondents had

said. I used radiography faculty members and an Oklahoma State University, Oklahoma City, doctoral cohort member for peer debriefing and member checks to establish credibility. Negative evidence and rival explanations were sought for and considered. The emerging data and research findings were linked to the literatures surveyed and theories used for analysis.

Transferability

Although the purpose of this study was not for prediction or generalization, the findings and conclusions drawn from the study may enable other radiography programs to combat student attrition, increase retention, and improve the general effectiveness of didactic and clinical education in radiography.

Researcher

I have been a diagnostic radiographer and have also taught radiography since 1991 at the community college and university levels. As a radiography educator, I taught didactic courses and also supervised and observed students at affiliated clinical sites. There is possibility of researcher bias because of my accumulated extensive didactic and clinical experiences in the radiography profession. In spite of my extensive experiences as a radiographer and a radiography educator, I exercised objectivity as a researcher in collecting and analyzing research data. However, in spite of the objectivity exercised, there are possibilities that my association with the radiography profession may have slightly influenced my reasoning during the research process.

Chapter IV presents an analysis of the data collected through individual interviews, focus group interviews, clinical observations, and program outcomes records.

CHAPTER IV

DATA ANALYSIS

Introduction

This chapter presents an analysis of data collected from program records, clinical observations, and individual and focus group interviews with radiography students, didactic instructors, clinical instructors, clinical supervisors, and radiology administrators. Research participants shared diverse opinions and perspectives. These opinions and perspectives were recorded, analyzed, and interpreted in order to find answers to the research question, "What is it like to be a first-year radiography student, and what factors contribute to student attrition and retention in radiography education?"

Qualitative research methodology gave the researcher an avenue to tell respondents' stories, in this case, what it was like to be a first-year radiography student, as students embarked on a journey of "academic/professional development and transition from prospective radiography students to professional radiography caregivers. This chapter provides an avenue for voices to be heard, for the researcher to present respondents' experiences and perspectives on first-year radiography program at CCUS. The voices of students who persisted and those who dropped out of the radiography program at CCUS during the study period are heard as they describe their experiences and explain why they decided to persist or drop out of the program. The voices of other research participants are also heard as they describe their experiences working with first-year radiography

students and give recommendations for improving the effectiveness of clinical and didactic education at CCUS.

As was pointed out previously, qualitative research is a form of naturalistic inquiry, and the main task involved is to "explicate the ways people in particular settings come to understand, account for, take action, and otherwise manage their day-to-day situations" (Miles & Huberman, 1994, p. 6-7). In a naturalistic study, the researcher, through personal observations and interviews, seeks to provide a rich, dense, detailed, and reflexive account of the situation under study. The purpose is to bring out the meanings or interpretations of the people that inhabit the setting (Denzin & Lincoln, 1994). According to Guba (1990), reality can never be comprehended fully; but it can only be approximated. The interpretations given below following data presentations are but one of many that could be constructed from the interviews, clinical observations, and program records at CCUS. Therefore, I do not make any claims that these interpretations are the absolute "Truth" or absolute answers to the research questions.

Radiography Program at CCUS

The community college under study, located in southwestern United States, is a state-owned two-year college with a population of approximately 10,000 students. The college offers an Associate of Applied Sciences degree in radiologic technology, with specialization in radiography. A cohort consisting of about 25 students is admitted into the professional phase of the program each year after completing required general education and basic science courses. The professional phase incorporates didactic and clinical sub-phases, which are presented five days a week requiring a total of 24 months

to complete. The program is stressful, time demanding, and equivalent to holding a full-time job or working a 40-hour week (without pay). The radiography program design coordinates classroom lectures and simulation laboratories at the college with laboratory and clinical experiences at affiliated clinical sites (CCUS program brochure, 2002).

Following lectures, laboratory simulations, and demonstrations at college radiography laboratories, students begin clinical education rotation at affiliated hospitals and clinics. Radiography clinical education rotations provide avenues for professional skill development and the integration of theory and practice. Students learn various radiographic techniques and procedures at school and clinical sites by observing laboratory simulations and demonstrations by didactic instructors and real life studies as clinical instructors perform similar medical imaging procedures on patients. Following these simulations, demonstrations, observations and some practice, students perform similar procedures on real patients, under a clinical instructor's guidance and supervision, in order to demonstrate competency in radiologic procedures mandated by the American Registry of Radiologic Technologists (ARRT Radiography Competencies, 2000).

The radiography program at CCUS is fully accredited by the Joint Review Committee On Education in Radiologic Technology, and students graduating from the program are eligible to take the national registry examination administered by The American Registry of Radiologic Technologists (ARRT). Successful completion of the examination qualifies and certifies the graduate to practice the radiography profession.

Data Presentation and Emerging Themes

The following sections present summaries and an analysis of research subjects'

responses to individual and focus group interviews, clinical observations, and program records, with the emerging themes. The analysis was written after repeated readings of the data collected and several hours of listening to the interview tapes. The research findings and emerging themes were derived from the interview summaries and data obtained from program records and clinical observations.

The analysis is presented using combinations of matrix displays and narrative format as a result of the volume of data collected. According to Miles & Huberman (1994, p. 141), "Analysis of qualitative data rests very centrally on displays that compress and order data to permit drawing coherent conclusions, while guarding the overload and potential for bias that appears when we try to analyze extended, unreduced texts". One of such displays is a matrix display. Data entries in matrix displays could be in the form of direct quotes, summaries, paraphrases, or researcher explanations (Miles & Huberman, 1994). Looking at displays enables the researcher begin to see themes, patterns, and clusters, which lead to good analysis, summaries, and conclusions.

Several themes emerged from interview responses, clinical observations, and program outcomes' records. These themes include student recruitment in radiography; a typical day in the life of a first-year radiography student; clinical interactions, relationships, and clinical instructors' attitudes towards radiography education; didactic interactions, relationships, and didactic instructors' attitudes towards radiography education; typical problems/difficulties experienced by first-year radiography students; didactic and clinical personnel perspectives on radiography education; student attrition and retention at CCUS; and students' perspectives on effective radiography education.

Theme One: Student Recruitment in Radiography

Interview question number one asked the students to recall what sparked their interests in radiography and why they decided to major in it. Table 3 is a matrix display summary of key statements from the responses of the 18 students interviewed.

As table 3 shows, nine of the 18 students interviewed learned of the radiography field through friends or family members working in radiology or other allied health professions. Out of the remaining students, one became interested in the field in the ninth grade while taking a career class while another student became interested after clinical observation of radiographic procedures (shadowing). Two students became interested in radiography after having x-ray procedures done on them; two other students learned of the profession while working in the medical field while two chose the field as a result of its high job opportunities and remuneration. Out of the 18 students interviewed, only one student became interested in the radiography profession as a result of familiarity with the program at CCUS. In the student's words, "I grew up in the city and knew that 'CCUS' offered the program. I thought it would be fun, easy, and something that would get me into a stable position."

None of the students interviewed reported learning about the existence of a radiography career or program through the recruitment efforts or activities of CCUS. This may not be interpreted as an indication of poor, or lack of, recruitment efforts at CCUS over the years. Discussions with the radiography program director at CCUS revealed that the program has recruitment activities at some metro high schools and during college-wide career information day (held twice yearly), at heart fair, and at health

Table 3

Summary of Responses Leading to Theme One

Student Respondent	Student Responses
R#1	"The open job market and the need (high demand) for radiographers sparked my interest in radiography."
R#2	"I was laid off from my job and given two years scholarship to go back to school and retrain. Friends working in the field introduced me to radiography, showed me around, and I decided that was what I wanted to do."
R#3	"Well, it was actually my Mom. She is a registered nurse. I just had, since the time I was little, had an interest in it. I just didn't have any other interest, in anything else."
R#4	"Well, initial interest in it was ninth grade career class... we got to look at different jobs and what they require. X-ray just caught my eye.
R#5	"One of my friends that goes to my church was in radiology school. She was talking about it, and that kind of made me interested."
R#6	"I work in the radiology department, at the front-desk. I was doing the film stuff and then, on the weekends, I was an assistant for the techs....would bring films and get patients and stuff. That kind of sparked my interest in it."
R#7	"My brother in-law was in radiography for 20 years. He sparked my interest."
R#8	"I wanted career in the medical field partially because of the money and partially because of the people. I like to work with people, and I like to help people."
R#9	"I grew up in the city and knew that 'CCUS' offered the program. I thought it would be fun, easy, and something that would get me into a stable position."
R#10	"Been through medical rotation and radiography was the only one I really liked."
R#11	"I chose radiography because my Dad's girl friend's daughter did it and said she liked it."
R#12	I like the field because it is always changing, and it is not going to be a boring job. I have also been around medical field all my life.
R#13	" When I was younger I was diagnosed with carpal tunnel syndrome so I've had quite a few x-rays and MRI's, so that was one of the things that interested me. I liked what they did, so I wanted to do it."

Table 3 Continued

Summary of Responses Leading to Theme One

Student Respondent	Student Responses
R#14	"I was an emergency medical technician for many years. And, I worked in a Cath lab and that is what got me interested in the x-ray field."
R#15	"My mother is a nurse, she's an RN. And, she kind of talked to me about the medical field so I just kind of chose radiology and went and reviewed it and it looked pretty interesting, so I just kind of went from there and chose it."
R#16	"A friend who is a nurse told me that there is a shortage of x-ray techs, and I have always wanted to be in the medical field. So I thought well, that's something that I will be sure to get a job in, so I can try it."
R#17	"I had a friend that was talking about going into Ultrasound. I just started checking out radiology field, and I was working at 'hospital D' at the time."
R#18	"When I was a child, my mother worked as an insurance biller for private radiologists group. When I visited her, I would go into these huge square rooms, and I would see these x-rays up all over the walls on view boxes. That sparked my interest in radiology."

information day rallies. The students' responses above mainly reflect that, among the radiography class admitted in 2002, the majority of students interviewed reported that they became interested in the profession as a result of factors other than CCUS recruitment efforts or activities.

As pointed out earlier in chapter one, one of the four major underlying factors responsible for the shortage of radiographers in the United States was the decrease in the number of new entrants into the profession. Prospective students shunned the medical imaging profession and chose careers in other fields perceived to be less stressful and more rewarding (ASRT, 2002). Nineteen first-year students were admitted into CCUS's radiography program in 2002 out of the maximum allowed class capacity of 25. Although it is difficult to pinpoint the factors responsible for the decrease in admissions,

active recruitment efforts could have helped to increase awareness of the radiography profession among prospective students and thereby attract more students to apply for admission.

Theme Two: A Typical Day in the Life of a First-Year Radiography Student

A first-year radiography student's typical day at CCUS affiliated clinical sites started at 7:00 am and ended at 3:30 pm. The day was characterized by slow and fast paced clinical activities (light and heavy patient load); familiar and unfamiliar radiographic procedures; lots of hands-on activities; stress; interactions with technologists, patients, radiologists, and other clinical personnel; and limited resting time.

A typical day at school began at 9 am, and it was characterized by hours of lecture and/or CD-ROM viewing of radiographic procedures and techniques, exams, laboratory and clinical simulations, and practice. In spite of the stress and busy patient load that characterized clinical education, a majority of the students interviewed said they enjoyed clinical education better than didactic because of the hands-on activities and patient interactions. Table 4, a summary of representative or typical students' responses to interview question #2, captures the nature of a first-year student's typical day at school and affiliated clinical sites. The 11 students' responses displayed represented the common perspectives shared by the 18 students interviewed. The rest of the responses were not included in the matrix display in order to avoid repetition.

The key complaint from many of the students interviewed was lack of adequate supervision by clinical instructors assigned to work with them at clinic. As a result of the

Table 4

Summary of Responses Leading to Theme Two

Student Respondent	Student Responses
R#1	"We assist the techs, stock rooms, watch, observe, and do basic radiographs."
R#2	"We stock rooms with supplies first thing in the morning. Patients start showing up around 8:30 to 9:00. They (the techs) allow us to do pretty much anything that we feel that we're qualified to do, and the more responsibility we take, the more they like because it eases their workload a little bit."
R#3	"This semester (spring 2003) we're shorthanded on techs. So, it's kind of like they're using us as techs, and it's like, wait a minute, I don't know what the hell I'm doing; you're shoving me in here and I don't know what I'm doing. I'd rather have somebody watching me, and okay, this is how you do it, and then I'll tell you what you did wrong."
R#4	" A typical day is coming to class. After class I go home and study, and I work also, approximately 5 hours, Monday through Friday. At the clinic we get to perform several x-rays or do some x-rays that we went over in class. And, I get to help and/or watch procedures that we haven't yet gone over in class or might come up only seldom."
R#5	" My clinic, I get there at 7:00 and usually it's kind of like, sometimes it's really busy and then, it kind of gets stressful sometimes; and sometimes we take x-rays, and there are techs that will help us out. They teach us stuff, and then we get a 30 minute break."
R#6	" The typical day, we'd get in there and I kind of follow the morning people around until the day people get there about 7:30 AM. I'm at the Trauma Hospital so we have more of the trauma than any of the other places. And, so I get to do, they let me do a lot of stuff."
R#7	" It is busy from 7 to 1 PM, but I have study time when it slows down in between."
R#8	"Some days at clinic are slow days; some days are not. A lot of procedures they do now are over my head, contrast media type of study. It's kind of discouraging because these is so much I want to go help with that I can't do yet. I get really tired after clinic."
R#9	"Lots of drama at clinic. Lots of time we are just used to get the patients for them (for the techs), and when they get busy it's like, we get out of their way or..."
R#10	"Clinical is hard and we are always busy all the time. Also class is fast paced. We do a chapter a day."
R#12	"Classroom is stressful, especially when you get behind. Lots of information."

shortage of radiographers and busy patient load at some clinical sites, clinical instructors were not able to devote adequate time to observe, supervise or instruct students. Students

did not get enough opportunities to work on patients and perfect their radiographic skills. Some students felt ignored by clinical instructors when patient load or exams increased.

Theme Three: Clinical Interactions, Relationships, and Clinical Instructors Attitudes Towards Radiography Education

The nature of clinical interactions, relationships, and attitudes of clinical instructors towards clinical education was emphasized by first-year radiography students during the interviews. A majority of the students identified the interactions and relationships they experienced at clinics and clinical instructors' attitudes towards radiography education as positive and conducive for effective teaching and learning. Some clinical instructors were described as good teachers, nice, respectful, approachable, easily accessible, and good communicators. These clinical instructors liked students and were happy to work with them. They explained procedures very well to students and showed them how to correct their mistakes.

However, some of the interactions, relationships, and clinical instructors' attitudes were identified by students as negative and not conducive for effective teaching and learning. Some clinical instructors were described as rude, not student friendly, not helpful or available when needed by students, and bipolar (speak well about students in their presence and poorly in their absence). Table Five is a matrix display of common responses that capture (in the students' own words) the nature of the clinical interactions, relationships and clinical instructors' attitudes towards radiography education. Some responses were not displayed to avoid repetitions. Participant observations of clinical interactions at affiliated clinical sites corroborate with student responses.

The interactions, relationships, and clinical instructors' attitudes towards first-year students and radiography education in general varied from clinic to clinic and also among students rotating at the same clinic. A clinical instructor at one of the clinical sites was particularly identified by the radiography students as "not student friendly". One of the students interviewed (R#9) made the following comment about this clinical instructor.

> All students fear going to this clinic because of her. The way she once treated me was demeaning, as a student and as a person. She treated me like I was a stupid person in life just because I did not know how to prepare for a barium enema. (R#9)

Although student respondent #1 made a positive comment concerning the attitudes of clinical instructors towards students, this was not totally the case at the beginning of clinical rotation. According to R#1, some of the clinical instructors that displayed negative attitudes towards clinical education at the beginning later changed attitudes as clinical rotation progressed. Student respondent #1 commented as follows:

> In the clinical instructor, there was one that wouldn't let you do anything. She would just take over the entire exam. You would ask her if I can assist you in this exam. She would say, yeah, sure. You go down to the room with the patient and she won't let you get a word in. She would manipulate all the machinery. She would do the technique. A couple of the RT's were like that. And, that wasn't conducive to learning in the beginning. Two of the techs were not devoted to teaching us at first, but later on, they opened up to us. There's not that many negative qualities. (R#1)

Table 5

Summary of Responses Leading to Theme Three

Student Respondent	Student Responses
R#1	" The people I work with out there are very good; they make sure we have all the information that we need to do an exam by ourselves; they do treat us as people. They're nice to us. They do let us know about our mistakes and they also show us how to correct those mistakes. I've never had an experience where I've been harshly chastised."
R#2	"They treat me pretty much as a co-worker; they treat me as a peer for the most part. The people at clinic give us a great deal of respect. Actually it's a good atmosphere to work in. The people there are just really happy to see students. These people like to teach. I've never had anybody lose their temper with me or just tell me that they didn't have time for me so far."
R#3	" Our clinical supervisor, she never seems to have time for us. I have seen her, so far this semester, for like 2 minutes and then she left. She never really came up there last semester either. The techs are good people. We enjoy working with them."
R#4	" My relationship with the rad techs at the clinical site is very, very good, it's open, it's fun…it makes it easier for me to want to learn a different procedures. You know it makes it easier for me to come to them if I have any questions on how to do a specific procedure. It's a whole lot of fun."
R#5	" There are some people that are kind of rude, and then that just makes it, like the whole day go bad, you know. But most of them, they're really helpful, and there are some people that doesn't want to do stuff with the students, and they just want to do it themselves."
R#6	" I have really good relationships with those guys there. It's two, two men that I'm with pretty much all day. And, they're very good. Both of them are very good teachers. They both show me everything they're doing and explain to me what they're doing. One of them is extremely good at explaining to me."
R#7	" I have pretty good communications with the techs. I can ask some questions with no problem, and they are able to answer the questions. They are always accessible; they are always right there, and they are real good in working with you."
R#8	" The two, like head techs, they are not student friendly. I just feel like am constantly in an interview. If I go to watch procedure, they are not very helpful. But the other techs are different."

Table 5 continued

Summary of Responses Leading to Theme Three

Student Respondent	Students' Responses
R#9	"They are nice to you when they are here, but as soon as they get behind you they say that you were unable to do something. Sometimes when you are doing a patient and you want the techs to watch you, they are there talking to someone else and not watching you. The techs do not devote enough time/attention to students the way they are supposed to."
R#10	" They are short handed. We are assigned to a tech for supervision, but they are not there most of the time."
R#11	" Mine has to do with barium enema. I have only seen one."
R#12	" There is not enough help for each student."
R#13	" Our clinical instructor that I am with, he is so much fun, and we feel comfortable with him. We're on a very good relationship with him. Everybody gets along very well. We almost feel like we work there with them. It's a lot of fun; it's a pretty good relationship. They're a couple of techs that don't like to work with students, and you encounter that at every rotation. There are a few techs that don't want to work with students."
R#14	" I've had very good relationships with the techs that I've worked with and I think that really helps you in the long run. It makes them more open. And that all comes down to your overall attitude towards clinic. You know, you're there to learn, and you're there to help them as much as you can. Sometimes you can make some really good friends with the other techs."
R#15	"I feel I have pretty good relations with all the techs at my site right now, and I think it's kind of good. They teach good because each one of them is kind of, you know, does things a little different. So it kind of shows you a few ways to do a different exam"
R#16	"It varies. One day is good, one day it's not. They are so busy that sometimes the students feel that we are in their way, that we shouldn't be there. There are other days they spend more time with us. It varies."

When students were asked to identify the qualities or characteristics they admired in their clinical instructors, respondent #1 responded as follows:

They are sincere about teaching us; I like their honesty. When we do something

wrong, they tell us what we did wrong, and they're not chastising us, they're just telling us what we did wrong, you know, constructive criticism. They are patient, good guides, good mentors, and trustworthy. (R#1)

The summary of responses displayed in table 5 and clinical observations reveal that first-year students in general, admire clinical instructors who are friendly, patient, knowledge-able, able to teach and answers questions, and allow them to do more hands-on activities (radiographic exams). Students admire a clinical instructor who is personal, caring and not intimidating; one who sets relatively high standards and doesn't joke around.

Theme Four: Didactic Interactions, Relationships, and Didactic Instructors' Attitudes Towards Radiography Education

Didactic interactions, relationships, and the attitudes of didactic instructors towards students and radiography education were crucial areas that were highly commented on and emphasized by the students interviewed. Table 6 is a matrix display summary of representative students' perspectives. The didactic instructors were described by students with the following positive expressions: good teaching staff, who exercises patience with students; easy to approach with questions; great teachers, who instill a lot of motivation; they makes us feel at home and relate to students like family; they know what they are teaching and are always there for the students. In addition to these positive expressions, respondent #9 made the following comments concerning CCUS didactic instructors.

The director is absolutely wonderful. She tells us how everything works or should be. She breaks it down. Professor 'Y' instills confidence into every single student. She makes it evident that she knows what we are going through as students. She

knows we have the ability to accomplish something. She explains everything in detail. She does wonderful job. Professor 'Z' has improved greatly. She used to test us over things we did not go over. (R#9)

Another first-year student, respondent #10 made the following comments:

There's a lot of interactions with our professors, which I think is very good. When we have problems or anything you want them to explain, they are easily accessible. You know, in the first year, you're so overwhelmed with what you're learning, you definitely don't want to get up in front of the room and try to explain. (R#10)

The comments made by a first-year student during one of the focus group interviews and discussion sessions crystallized the nature of the interactions and relationships that existed among first-year students and between first-year students and didactic instructors. According to this students,

The director gives us extra push, and she is always available. The director now cares about whether you pass or not, but the director before did not care. We are the first class ever that no one dropped out of the program during the first semester. We are all still here. Motivation among the class members is part of the reason and the director is part of it. Everybody in the class feels like we are family, and we help each other. The bulk of the motivation is coming from the teachers in class. At clinic, the motivation is coming from each of us. If someone is having a bad day, we help each other out. (R#12)

We could see from table 6 and other students' responses that, despite few negative comments concerning the attitude of one didactic instructor, the didactic instructors, in

Table 6

Summary of Responses Leading to Theme Four

Student Respondents	Student Responses
R#1	" We have a very good teaching staff. We all have become sort of like family. I have no problems going to them if I have problems. I feel very comfortable.... We came together very well in the classroom. We all know each other. We hang out together outside of the classroom, and because we have that bond with each other, we are able to help each other out if someone is lagging in one particular subject."
R#2	" Again, it's been real good. The instructors are real patient, I feel like that we're treated very respectfully here also. It's been a good atmosphere for me."
R#3	" I like the way 'X' teaches and I really like the way 'Y' teaches. And then there's "Z'; it's like, she gets real impatient with us. 'X' and 'Y' seem more patient with us, and if we have more questions, then it's like, okay we'll stop and we'll address everybody's questions that they have."
R#4	" Relationships with the teachers? They're good they're easy to go to and ask questions."
R#5	" They're really nice, like they're really helpful, like they're there when you need them, and then, you know, they'll help you out. They're really good. I like all the teachers, all my teachers. They help out and make you feel at home."
R#6	"Mostly the faculty members here are really nice and I think they know what they're teaching and they try to definitely focus on what you're going to be experiencing on the actual exam for your, you know, license. they're always there if you need to go ask a question or something, or if you have a problem. There is one that has done, went over and above being just a teacher. She actually tried to be, you know, a friend and has actually shown how much she cared by, you know, doing special things."
R#7	" Its good. It's always very informative. They instill a lot of motivation. They are great teachers. I have learnt more from professor 'X' since she has been there."
R#8	"Professor 'Z' is definitely a hard nose, but it's given me more aggressiveness. Professor 'Y' is more laid back, easy going. She gives a more comfortable setting in the classroom. She is not real picky, and she realizes we are students. Professor 'X' is like, 'here I am if you need me'. She is cool and very comfortable to talk to. I can go to talk to her and it's real comfortable. She seems very goal oriented and knows what needs to get accomplished."
R#11	"They are always helpful."

general, have contributed immensely in helping the students progress toward achieving their educational goals. The students have also contributed immensely towards their goal by working closely together and helping each other when in need. It is a true fact that, in CCUS history, the 2002 first-year radiography class became the first class that did not loose any student to attrition during the first semester of professional program. The motivation coming from the didactic instructors, clinical instructors, and from the students (in addition to other factors) may have contributed to make this possible.

Theme Five: Typical Problems and Difficulties Experienced by First-Year Radiography Students

This section lays out, in students' voices, the problems and difficulties students encountered during the first year of professional radiography education at CCUS and affiliated clinical sites. Some of the problems were universal among affiliated clinical sites while others were peculiar and unique to a given clinical site. As would be seen later, some of these problems/difficulties encountered by the students (especially during the first semester of their professional program) later contributed to student attrition.

Respondent #1 entered the radiography program at the community college under study without prior experience or familiarity with the healthcare or clinical environment. His initial shock when first exposed to this environment was captured in this expression.

> I had no experience in the hospital, and that pushed the class along faster than what I was able to keep up with. I caught up eventually, but not having had experience in the beginning of the class was detrimental. Probably just being uncomfortable in unfamiliar environment to start the clinicals. I felt very

uncomfortable working with the patient for the first time. (R#1)

Respondent #2 spoke of the stress and pressure she experienced as a result of exposure to new knowledge and information she had not encountered previously in her former education. There was also an added stress from nervousness and pressure to complete the required clinical competency examinations and make good grades.

> The first semester was a lot of pressure. Things you have never heard of before. The pressure I was under was to make good grades. I probably got a lot of stress just from the newness of the situation and I was not sleeping well. You feel a little pressure to try to get the number of examinations that they want in competencies. And, I always felt nervous with people watching me. I felt like I would do okay until somebody would come in to observe my exam. Once the patient walks in the room, it goes completely out of your head. It's as if you had never done it before, or even heard of it before...Keep your little clinical notebook in your pocket and that way, if you just lose it all, you can pull it out and follow the step-by-step instructions.

Respondent #3 emphasized the lack of clinical supervisions experienced by many of the students at affiliated clinical sites. This was also confirmed during my visitation and clinical observations at some of the affiliated clinical sites. Clinical education regulation requires that students should not be left unsupervised while performing radiographic examinations. The following comment was made by Respondent #3:

> Last semester, we had second years from SC, which helped us more than the actual techs did. And this semester, we're shorthanded on techs so it's kind of like they're using us as techs, and it's like, wait a minute, I don't know what the hell I'm doing.

The techs aren't really there to watch you. We were told that you were not to make an exposure without somebody watching you, physically behind your back watching you. I probably don't understand stuff the first time that they tell me. It's, I have to go home and study it, and then it's like, okay, I think I got it. (R#3)

Respondent #4's biggest problem was manipulating the x-ray machine and coming up with the correct technical factors necessary for producing a diagnostic radiographic image. Responding to question #8 she said, "I would have to say the different techniques you have to use for different body parts or patient size. That can be confusing". Respondent #5 also spoke of her initial fears operating the x-ray machines and performing radiographic examinations on patients.

Like first, when we got there, I was really scared, you know. I didn't know what to do. Like, you know, the machines and stuff; x-rays that I'd take. But after doing a lot of x-rays, I know now I'm kind of confident what to do, you know, with x-rays, and I think I'm able to do it by myself. There are some people (techs) that don't want to work with us. Like, you know, they're students so you don't want to be with them kind of thing. And, so I don't like that. But, most of them are really nice. (R#5)

Respondent #7 had problems initially with the basic things involved in producing a radiograph. He also added that, "technique is an ongoing problem especially since they changed to computed radiography". Respondent #8 expressed the difficult nature of the radiography program in the following statements:

It is a difficult program. I think it is tough. Anything in the medical field is tough because there is a lot to be learned and memorized. The first week of class they

warned us to be prepared because it was never like anything we've learnt in the past, and that was the truth, definitely the truth. The progression was OK that it didn't seem too much afterwards. I kinda thought they would have done more technique in the beginning. (R#8)

Radiography programs, in general, are cohort-type programs. There is no room for part time attendance. All students admitted into the program begin the professional courses together and are expected to graduate together and make room for the in-coming cohort. Several of the students interviewed had family (some with children) and also worked part time while carrying a full load doing the radiography program. As a result, time was a big luxury and there was never enough of it. This was very well expressed by respondent #9 when she said, "Time. I don't have enough time to complete the required homework and studying. It is very demanding. I work about 30 hours per week too". Respondent #8, who later dropped out of the program during the second semester as a result of loss of interest in radiography, made the following comments before dropping:

I come to class; after radiography, I have another class (government class). I go home after class and do laundry; and after the kids go to sleep, I study for about an hour. In the morning, I hit my alarm clock about seven times before I get up. I then get ready, drop off my kids at the daycare and head to clinic.....They need to start clinic an hour later. I would much rather go to the clinic 8 to 4:30 pm instead of 7 to 3:30 pm. In my husband's last position, he had to be at work at 5 am, and that made things difficult for us. (R#8)

Sometimes, the stress students experienced during clinical education was the result of

patients' reaction to certain type of radiographic procedure being performed on them or periods when the x-ray machine malfunctions. Respondent #10's experiences performing barium enema procedures on patients expressed this point. She made the following point, "sometimes the patient is mad at you for something that is truly not your fault. Like performing a barium enema on them. It is not comfortable, but they have to do it". Respondent #12 also said, "The x-ray machines are computerized, and sometimes they lock-up, 'this extends the examination time' and causes discomfort to the patient".

Theme Six: Didactic and Clinical Personnel Perspectives on Radiography Education

This section presents the summary of didactic and clinical personnel responses to interview questions and their views/perspectives on radiography education at CCUS. Didactic and clinical personnel maintain very close contact with radiography students as a result of their teaching and supervisory obligations. They have taught, supervised, and observed several cohorts of radiography students over the years, and for this reason, their perspectives are very crucial and would help immensely to shed light on what it means to be a radiography student and the factors that contribute to student attrition.

Didactic perspectives

On the issue of whether the admission criteria and requirements in use at CCUS enables the program to admit qualified students who are academically prepared to pursue and successfully complete the program, the current program director responded as follows:

As I've mentioned before, in hospital programs, we had a much different prerequisite system. There really was no prerequisite. Here, though, I feel very comfortable with

the prerequisites that we have. They've got anatomy classes they have to take. Medical terminology is a real, I think, real eye opener and a big challenge, and if they can't make it through that, then that's probably a good weeding out process. Psychology is very important. Introduction to computers enables them to work a little bit more easily.... From my limited time here, I think the prerequisites are well constructed.(RX)

Responding on the adequacy of the admission criteria, a CCUS didactic instructor said,

I think that they do as long as we adhere to those criteria. We have had problems in the past when we've had a low quantity of students applying for the program and we've accepted students with lower standards or criteria. And there may be a correlation, I don't know, between attrition rate, based on those times. (RY)

Responding to the admission criteria and requirements issue, the former interim program director had this to say about the changes she instituted as interim director.

Whenever I became Program Director, we changed the prerequisites. So, now they are enforced. They have to have their prerequisites before they get in. You know, they can't be taking outside classes while they're in the program. And, we have set minimum requirements on compass tests to make sure that they have minimum reading, writing and arithmetic skills...We were hoping, that would help our retention somewhat. This is our first class. The first-year class that we just admitted is the first one that the change has actually gone into effect for.(RZ)

Respondent RY brought out an important point that admitting the best-qualified

students into the program might not guarantee zero attrition. She emphasized that other factors might still cause students to drop out of the program. Respondent RX responded on the issue of factors that may lead to attrition saying,

> Financial problems may cause them to drop out and lack of a support system. That may be a spouse; that may be a supportive boyfriend; it may be a family; they may be living at home with their mother or father, or whatever the support system is. (RX)

While stressing that good admission criteria and well-prepared students may not guarantee retention, respondent RY made the following important comments concerning other factors that had contributed to student attrition in the past CCUS.

> But still we can have very well prepared students drop out because of outside Influences. And sometimes it's economics. Especially now, you know, you can make more money working for UPS than as an MRI tech. We had a student who graduated in 1996, excellent student. His part-time job was working for UPS and he continued working for UPS after he graduated because he made more money. We have had people that have dropped out because they realize they're not going to make as much money as they thought. And a lot of times, it is personal problems because they don't understand the commitment. It's time, and it's also energy, and focus. I mean they really have to be focused, and some families, family members don't like the focus shifted off of them into the school studies, you know. So we see a lot of divorce and abuse. We've had some domestic violence occur, you know. And so, that makes it difficult for them to complete a degree even though they may be prepared. We've had students commit suicide too. We had one. And I think

there were one or two before I came. And that was linked to a divorce. So I don't know how many of those stressors came from the Radiography Program. (RY)

On the issue of whether clinical instructors received training on how to work with and evaluate students the researcher discovered that training has not been given in an organized fashion in the past. The training that was given to clinical instructors in the past was done mostly on individual basis as a result of time crunch. The radiography program director responded on this issue as follows:

> We haven't. To my understanding, that really hasn't happened in a planned fashion up until now...But I do have some texts that are written especially for clinical instructors, that I would like to disseminate to our clinical instructors perhaps a chapter at a time....Some of them have been doing what they do as clinical instructor for many years, so I don't wish to offend them by implying maybe that they don't know what they're doing. But, they still, I think, could use helpful hints on how to incorporate praise into reinforcing positive behavior or counseling. (RX)

Responding on this issue, the former interim program director commented as follows:

> Whenever we, within a year the JRC requires that we give this training to our clinical instructors so typically I will meet with them. I'll go over all of the paperwork that we use and go over the policy and procedure book and go over the clinical handbook and tell the clinical instructors what their responsibilities are... I meet with them individually, but I like the idea of bringing all of them here together. (RZ)

The didactic instructors spoke at length concerning the difficulties first-year students encounter during the first semester of their professional program. The first eight weeks

(characterized mostly of classroom lectures and laboratory simulations with old non-computerized, less sophisticated equipments) appear to be the most stressful period because the students are suddenly bombarded with a large body of knowledge and concepts that are very difficult to visualize and understand. At the end of the first eight weeks, they begin their clinical education at affiliated hospitals, another highly stressful environment enveloped by more highly sophisticated, computerized, radiographic equipments. Using respondent RY's exact words, the situation was described as follows:

> .....we don't have the most up to date equipment and so it doesn't fully prepare them for what they walk into at the clinic, where it's more high tech and then they're surrounded with a real stressful environment, a new environment. And, I think that some of them aren't equipped with the study skills that are necessary because they've never been in a program that requires so much focus....But I think, the aspect of clinical education, they're not used to that. They're used to sitting in a seat, taking an English (or other non-clinical) class. And you go home and you complete your work and that's it. And you don't have to go practice English out in the community. And so I think that so much of their energy is expended at the clinic that they're sort of physically depleted when they get in the classroom. And sometimes it's difficult for them to balance their efforts between classroom and clinical. (RY)

Respondent RX described the information overload experienced by students during the first eight weeks as, "trying to cram a quart's worth of information into a pint container. You're learning so much, so fast, and it can be very overwhelming." (RX)

Then, there is the issue of autonomy. According to Respondent RZ, the students are used to more autonomy in the classroom and at home, but not at the clinics. At the clinics, the students are sort of confined and watched more closely. This makes some students feel pressured, stressed and nervous while performing required competency exams. Some complain of this situation saying that they could do the exams right if no one was watching them. But, how would the instructors know they did everything right if they were not watching and supervising the students?

So many steps go into making or producing a radiograph. The clinical instructors and supervisors are required to watch and supervise the students at each step to prevent mistakes that may lead to endangering patient's health, repeating the procedure, and/or exposing the patient to unnecessarily high dose of ionizing radiation. Good supervision requires that the instructor provide a relaxing, non-intimidating atmosphere for the student to concentrate and do a good job. One of the students, respondent #5, described the state and supervisory atmosphere she constantly was exposed to while performing her competency exams.

> My clinical instructor, she's kind of scary. To tell you the truth, we're like, we're all scared when she's there, like, you know, she'll like yell at you and say if you don't do it, you know, so that's kind of scary. When she is there, I get really nervous, like you know, I tend to do things wrong when she's there cause she's like, really intimidating. I'm like really scared when she's there. Like, you know, when she's not here, I do stuff right, but when she's here, I don't know. Like when she comes in, everybody's like, oh, she's here, and we all get scared. It's just like the way she is, I

mean she is trying to like help us out, but it's just kind of scary in a way. I think she knows that, like everybody gets nervous when she's there, but it's just the way she is, you know, I guess. (R#5)

I had the opportunity to observe Respondent #5 perform a radiographic procedure at one of the affiliated clinics under the supervision of the clinical instructor just described. The student was not relaxed; she made some mistakes and the clinical instructor's assistance was needed to help complete the procedure. Although Respondent #5 was more relaxed while performing another procedure under the supervision of a different clinical instructor, this instructor remarked to me that R#5's clinical skills needed improvement. Respondent #5 later dropped out of the program as a result of academic problems. She flunked the course in radiographic physics.

The interventions or strategies in place for combating the factors that may lead to student attrition at community college under study (according to the didactic faculty) included workshops on study skills, test taking skills, time management, and free counseling. In addition to this, the radiography faculty kept an open dialogue with the students and always let them know the faculty was available for them any time they needed to share their problems and difficulties. The didactic faculty emphasized that their goal has always been to help and support the students to successfully complete the radiography program and become gainfully employed and not to fail or weed them out of the program.

Clinical perspectives

The clinical personnel shared important points and perspectives as a result of their experiences working with radiography students attending CCUS. The clinical instructors said they liked to work with students and teach them how to perform x-ray procedures. Although some of the students are easier to teach than others, in general, clinical instructors prefer working with first-year students because they do not have "attitude problems" (they are more willing to follow instructions and are easier to teach than second-year students). Work attitude, they remarked, starts to change as soon as students enter the second year of professional radiography education. According to the clinical instructors, students in their second year begin to think they have gotten it made and feel reluctant taking responsibilities as they did before while in their first year.

Some of the students (according to the clinical instructors) complain of being overworked and used as free labor, especially the younger ones. Not all of the younger students, they said, acted that way, and sometimes, experiences working in the real world before attending radiography school could make a big difference in students' work attitude. One clinical instructor interviewed responded as follows:

> Some of our students that are younger feel that they are really being taken advantage of to expect that they would want to work for free....They do not understand that we are giving of ourselves to give them what we know. They do not understand that, that is valuable, and that they are receiving something valuable by coming to clinics. They think we're taking advantage of them.....We had a student last semester that obviously had worked in the real world. Even though he was in his early 20's, he

wanted to learn and he was very humble and would do whatever needed to be done. And then we have some students that are like in their 40's, their early 40's, and they're very good students. They do everything that needs to be done and look for other stuff to do. And then we had another one that was right around 30 that was that same way. (R#26)

Another reason clinical instructors prefer working with first-year students is that these students spend most of their first year in their original clinical site after being groomed in the techniques, procedures, or protocols used at that clinic. Clinical sites sometimes vary significantly in the equipment, techniques, procedures, or protocols used to acquire diagnostic images. As a result, this poses a big retraining and reorientation problem when students are sent to new clinical sites during the second year of the radiography professional program. Students have to be retrained by clinical instructors at the new clinical site in order to be able to use their equipment, techniques, and protocol. This is like playing the ball game over and over again, and it consumes precious clinical time that, sometimes, is not available.

Although sending students to different clinical sites poses a big retraining and reorientation problem to clinical instructors and the students, in the long-run, the wide latitude of knowledge, techniques, and different ways of doing procedures will become a valuable asset to the student and the profession.

I was really interested in interviewing respondent #26 because she was the clinical instructor identified by most of the students as being hostile to them and difficult to work with. It was stated by the students that everyone dreaded going to clinical site B because

of respondent #26 attitude towards students. While probing into respondent #26 views on clinical education and the working relationships that existed between her and the students, she brought out very interesting and important points. She said,

> Through the years, I've seen some people come to clinic, and they have such an attitude that they're **NOT** going to be taught and they're **NOT** giving any free labor. They won't work with you. You can't teach them anything. So you just have to walk around them for four and a half months and try not to bump into them. You know? I can't give a person like that a good evaluation. There's no way. Also the forms that we get are hard to evaluate a student with because, sometimes there's no right answer on it. And then some of the students are actually hostile. And then there are others that are so sensitive that if you try to instruct them or whatever, they go back to school and report you to the teacher that you made them cry, blah, blah, blah, blah, blah, blah, blah. And you know, it's just a nightmare, and so they come back and you just try to stay out of their way. Those are people who have not been out in the work field. People that have never had to do a job and make a living, they don't make good students. (R#26)

Respondent #26 agreed that the best clinical evaluation of students would be for every technologist or clinical instructor that has worked with a student to be given the opportunity to evaluate that student and then the average score from those evaluations should be used to evaluate the student's clinical performance.

Another area that clinical personnel emphasized is the lack of good communications between students and technologists. Good inter-personal relationships and interactions

between the instructors and the students are necessary for learning to occur. Clinical instructors stressed that the students needed to be taught how to relate to clinical personnel because this would help them get along better and create an atmosphere where teaching and learning could occur. Respondent #26 analyzed this point very well during an individual interview with her. She said,

> I think one of the courses in the first semester before they come to clinic ought to be, personal relationships, to teach students how to learn and how to interact with people that are going to teach them because if they had that, I think, that would help them. It would have helped me because I didn't know how to learn from the techs. I didn't know how to talk to them. I didn't even know what questions to ask. And so, as a result, I talked to very few of the techs when I was in school and didn't learn a whole lot when I was in school. When I graduated from CCUS, I did not believe that I was capable of holding a job. I truly did not. I made an 85 on my registry. I graduated fourth in my class. So I wasn't, you know, a dunce. You know, I wasn't the brightest kid on the block, but I wasn't the most stupid either. I did pretty good, but I did not think I could hold a job; I didn't know how to take x-rays. The program is different today, but the reason I didn't know how was, I was afraid of the techs. I hated clinic like a plague because I didn't know how to talk to them. And, I think that's the main thing that students have a problem with now. They don't know how to talk to techs. If they had that, I think they'd learn how to talk to their instructors and their whole life would be much easier. It's communication skills. (R#26)

Another area identified by clinical instructors that puts a lot of pressure on students is

the evaluation of students' completed competency films by clinical supervisors from CCUS. The methods utilized by some of the clinical supervisors for the evaluation process, they said, are intimidating and not student friendly, and students always become nervous and sweat through the process. In addition, some of the different competency exams or procedures students are required to complete on patients are difficult to obtain because those procedures have become outdated and are no longer performed very often.

The following is a summary of the additional perspectives shared by clinical personnel (clinical instructors, supervisors, and administrators) on other issues and the typical clinical problems or difficulties faced by first year radiography students at CCUS.

1. An assistant director of radiology commented that some clinical instructors expect first-year students to know or be able to perform more diagnostic procedures and technique than students are capable of during the first year of a professional program. As a result, students become frustrated for failure to meet this expectation.
2. As a result of the busy schedule and heavy patient load at affiliated clinical sites, clinical instructors ask students to perform unfamiliar radiographic exams.
3. If students feel frustrated with clinical instructors or clinical education, bad personality clashes may result, and this could lead to attrition.
4. One of the radiology directors interviewed stressed that clinical sites should expect less from students during the initial semester and that students should not be over-worked or used mostly to do the servant type of things (the drudgery). They should be allowed to be students and not used as employees or overworked

during the initial phase of professional clinical education rotation. This could help lower student attrition.

5. Clinical personnel stressed that school is hard, and dealing with clinical instructors at the clinic is equally hard. For this reason, both the student and techs should receive seminars on how to relate at clinic.
6. Students' clinical expectations and the pressure on clinical instructors to turn in good diagnostic radiographs (diagnostic x-ray films) could lead to problems and personality clashes between the two. Some students become offended when they are corrected during a radiographic procedure.
7. Student success in radiography education requires long hours of commitment.
8. The combination of didactic and clinical problems and other factors may lead to student attrition
9. One clinical supervisor wanted the community college under study to consider the idea of rotating students through different hospital time shifts in order to give students the opportunity to become familiar with the different types of procedures that are prevalent at particular shifts (for example trauma cases are more prevalent during the second or evening shift).
10. Clinical sites should consider sending representatives to CCUS to talk to the students on clinical expectations, responsibilities, and interpersonal relationships at work (during clinical rotations).
11. First-year students seem to be apprehensive, not very assertive, when compared to second-year students.

12. As a result of the shortage of radiographers and busy schedule at clinic, students do not get as much time as they need to perform required competency procedures. Clinics sites rush to get the patients in, out, and make room for the next patient or procedure to follow.
13. Clinical instructors are willing to help students learn as long as students are willing to apply themselves to learn.
14. A clinical instructor pointed out that some clinical instructors do not care about students or the whole idea of clinical education.
15. A clinical instructor who graduated from CCUS years ago stressed that students should be treated fairly, and that they need more instructions on techniques to be able to select adequate exposure factors while performing radiographic exams.
16. A male clinical instructor really stressed that students should help to clean x-ray rooms and not sit in the break area doing crossword puzzles. He also commented that students ask dumb questions sometimes, that they need to think before speaking or asking questions.
17. A common response given by several clinical instructors (CI) was that some students have no confidence in their ability. They are scared of doing something wrong (like hurting the patient) and are afraid of failure.
18. Another response was that clinical instructors build confidence in students through repetitions. On the other spectrum, some students are over confident, and this frame of mind sets them up to make mistakes.
19. Clinical instructors said they would like to have some feedback on clinical site

evaluations performed by the students at the end of rotations. Although CCUS sends a summary of the evaluation to clinical affiliates, the clinical instructors pointed out that they never saw the summary.

20. A radiology director (a former clinical instructor) wanted both students and instructors to increase the quantity and quality of their involvements in didactic and clinical education and work a lot harder in order to increase learning and prevent student attrition.

Theme Seven: Student Attrition and Retention at CCUS

Table 7 below presents a historical overview of program outcomes data on first-year radiography students' admission and attrition rates at community college under study between 1997 and 2003. As shown in the table, the number of students admitted into radiography program at CCUS declined from 25 in 1997 to 18 in 2001 and then increased to 19 in 2002. In addition to this decline in admissions, student attrition rate among first-year students increased from 32 % at the end of 1997/98 academic year to 52 % in the 1999/2000 academic year. The attrition rate then declined to 45.5 % during the 2000/2001 academic year. The next two academic years (2001/02 and 2002/03) showed a marked decrease in first-year student attrition. The attrition rate declined to 16.7% and 21.0 % respectively.

The reasons recorded for student attrition ranged from academic to clinical, personal, and other. Some of the personal reasons that contributed to attrition were identified while some were not. Out of the eight first-year students who dropped out from the program in 1997, three dropped out as a result of academic reasons (they failed one or more

professional courses), while five dropped out as a result of personal or other reasons. Some of these students stated that the radiography program turned out to be different from what they had expected it to be. The time demand and the magnitude of work inherent in the didactic courses and clinical rotations were extremely stressful and equivalent to working a full-time, 40 hour-week job. One additional student from the 1997 class later dropped out in 1998, while in her second-year (for personal reasons). In 1998, a student died. This increased the total number of students who dropped out from the class admitted in 1997 to 10. The total attrition rate among this class increased from 36 to 40 percent.

Twenty-one first-year students were admitted in 1998. Out of this number, nine students dropped out (eight during the first year and one during the second year); six students dropped out for academic reasons and three for personal reasons. One of the students that dropped out had a stroke. One student was dismissed as a result of repeated cheating during exams while one left the program for a high paying job. The program admitted 23 students in 1999. Twelve of these students were lost to attrition; two for didactic reasons (failed one or more courses), eight for personal reasons, and two for clinical reasons. The personal and clinical reasons given by the students ranged from loss of interest in the radiography program to loss of job in the family (financial reason) and lack of interest in the clinical education aspect of the radiography program. One of the students who dropped out as a result of clinical reasons complained that the clinical instructors at the hospital hated her and that the clinical environment she was constantly exposed to was not conducive to learning.

Table 7

Historical Overview of First-Year Student Attrition at CCUS

SCHOOL YEAR	NUMBER ADMITTED	STUDENT ATRTN	% ATRTN	ATRTN REASONS	ATRTN BY REASONS	% ATRTN BY REASON
1997/1998	25 (18 F & 7 M)	8	32.0	Didactic	3	12
				Clinical	0	0
				Pers/Other	5	20
1998/1999	21 (18 F & 3 M)	8	38.0	Didactic	6	28.5
				Clinical	0	0
				Pers/Other	2	9.5
1999/2000	23 (22 F & 1 M)	12	52.2	Didactic	2	8.7
				Clinical	2	8.7
				Pers/Other	8	34.8
2000/2001	22 (15 F & 7 M)	10	45.5	Didactic	6	27.3
				Clinical	0	0
				Pers/Other	4	18.2
2001/2002	18 (15 F & 3 M)	3	16.7	Didactic	2	11.1
				Clinical	0	0
				Pers/Other	1	5.6
2002/2003	19 14 F & 5 M)	4	21.0	Didactic	2	10.5
				Clinical	0	00.0
				Pers/Other	2	10.5

Attrition (Atrtn); Personal (Pers); Female (F); Male (M)

Ten out of the 22 students admitted in year 2000 dropped out of the radiography program. Six students dropped out as a result of academic reasons while four dropped as a result of personal reasons. One of the students from this class left the radiography program as a result of the stress and financial problems that enveloped him while going

through a divorce. Five of the six students who dropped out as a result of academic reasons were later readmitted into the program the following academic year 2001/2002. This group of readmitted attrition students constituted the convenient, purposeful sample of first-year student dropouts I interviewed. They were selected to participate in the study because of their association with the three administrative periods at CCUS (Pre 2001, 2001 to 2002, and post 2002).

The former radiography program director at CCUS retired in 2001 and the clinical coordinator became the interim program director. A new clinical coordinator was hired to fill the vacant position. The interim program director proceeded and changed the way prospective students were admitted into the program. Previously, students were admitted into the radiography program regardless of whether they had completed all or still needed to complete some of the required general education or basic science courses. Admitted students who were deficient in any of the required courses were allowed to enroll in the professional radiography courses and concurrently enroll in the deficient courses. This situation increased the course load and put a lot of pressure and stress on the students. The interim director put an end to the practice of admitting students who have not completed all the entry/admission requirements. Only prospective students who have completed these requirement were now qualified for admission into the program. This change in admissions requirements went into effect with the 2002 admission class.

Table 7 shows a big drop in attrition rate among the radiography class admitted in 2001 following the retirement of the original program director. The rate dropped to 16.7 percent, the lowest rate in the six years this research studied. Out of the 18 students

admitted into the radiography program in 2001, three students dropped out during the first year (two as a result of academic reasons and one as a result of personal reasons). One additional student from the 2001 class withdrew in the spring of 2003, towards the end of her final year. An exit interview logged her reason for withdrawing as loss of interest in radiography, especially in clinical education. The student hated the clinical education aspect of radiography, the idea of working with clinical instructors at affiliated clinical sites. The loss of this additional student in the spring of 2003 increased the attrition rate among the 2001 class from 16.7 to 22.2 percent.

Another change in radiography program management occurred at CCUS. A new program director was hired to take over the administration and management of CCUS radiography program in fall 2002. As a result of this change, the newly hired clinical coordinator was let go and the interim program director went back to her former position as clinical coordinator. That year, 19 students were admitted into the program, and for the first time in the school history, no student was lost during the first semester of first-year professional program. This was the semester this study began.

The thrill resulting from no attrition among the 2002 first-year class soon faded away. During the following semester (spring 2003) the radiography program lost four students from the 2002 class. Exit interviews revealed that two students dropped out as a result of academic problems (failure to pass radiography physics) while the other two dropped out as a result of personal reasons. Although the class admitted in 2002 lost four students, their attrition rate was low compared to what they were before the change in admissions requirements was made and enforced.

One of the four students that dropped out from the 2002 class, identified as respondent number eight, lost interest in radiography and wanted something more challenging. She wanted to study medicine and become a medical doctor. She had young children that she had to get ready for daycare very early in the mornings before rushing to her clinical site on clinic days. Clinical days were very stressful and tiring to her. Using her exact words, she said, "I get really tired after clinic". Although this was not part of the admissions requirement, She was also taking a business class while enrolled in radiography professional courses.

Although R#8's reason for dropping out was because she wanted to study medicine (radiography was not challenging enough to her), I think that school/family commitments and the negative mentoring attitudes displayed toward her by the clinical instructors she worked with must have produced a lot of stress and pressure that contributed to her dropping out. The following comments were made by R#8 when I interviewed her:

> It is difficult when this is the type of field you don't want to be in. The two, like head techs there, are not student friendly. I just feel like am constantly in an interview. If I go to watch procedure, they are not very helpful. But the other techs are different …I like classroom the best because sometimes I feel like I am getting in their way at clinic. It is mentally stressful. Can I do this, can I not do this. Should I jump in and help or not. I come to class; after radiography, I have another class (business class). I go home after class and do laundry; and after the kids go to sleep, I study for about an hour. In the morning, I hit my alarm clock about seven times before I get up. I then get ready, drop off my kids at the daycare and head to

clinic.....They need to start clinic an hour later. I would much rather go to the clinic 8:00 to 4:30 pm instead of 7:00 to 3:30 pm. In my husband's last position he had to be at work at 5:00 am, and that made things difficult for us. (R#8)

One of the two students that dropped out in 2003, as a result of failing physics, described the difficulties she had at clinic during a personal interview with her. Using her exact words, the following was her description of her clinical education experiences and the working relationship that existed between her and her clinical supervisor, whom she identified as her clinical instructor.

My clinical instructor, she's kind of scary. To tell you the truth, we're like, we're all scared when she's there, like, you know, she'll like yell at you and say if you don't do it, you know, so that's kind of scary. When she is there, I get really nervous, like you know, I tend to do things wrong when she's there cause she's like, really intimidating. I'm like really scared when she's there. Like, you know, when she's not here, I do stuff right, but when she's here, I don't know. Like when she comes in, everybody's like, oh, she's here, and we all get scared. It's just like the way she is, I mean she is trying to like help us out, but it's just kind of scary in a way. I think she knows that, like everybody gets nervous when she's there, but it's just the way she is, you know, I guess. (R#5)

The other student who dropped out in 2003, as a result of flunking physics (R#4), was a single mother. She worked long hours while in the radiography program as a result of family and other financial obligations. When asked the question, 'If you were to change or redesign any aspect of radiography education, what would it be and why?' she

responded saying, "Remove physics because I am not all that good in Mathematics". (R#4) The fourth student who dropped out in 2003, as a result of personal problem, lost interest in radiography and quit school before the spring semester was over.

It is difficult to pinpoint the actual reason that was solely responsible for each of the student attrition incidence that occurred at CCUS. It appears to be a combination of several factors that span across financial, job commitments, academic problem (didactic and clinical), family obligations, clinical instructors' attitude, loss of interest in radiography, stress, the quantity and quality of student involvement or commitment, and inefficient time management. The case of respondent #8 is an example. She may have dropped out as a result of several factors, which included family commitments and obligations, negative clinical instructors' attitude, loss of interest in radiography, and stress. The case of R#4 and R#5 also appear to be due to a combination of factors (didactic, financial, and family commitment/obligation for respondent #4; didactic and clinical for respondent #5).

Theme Eight: Students' Perspectives On Effective Radiography Education

The radiography students at CCUS shared important perspectives on the characteristics of effective radiography education. Earlier in chapter one, effective radiography education was defined as radiography education that enables radiography students to acquire the required knowledge and skills that will help them to successfully complete a radiography program and become certified to practice in the profession.. Table 8 presents the summary of students' responses to the interview question," How would you define effective radiographic education"?

Table 8 reveals that the characteristics of effective radiography education, as defined by the students, incorporates several factors. Students want state of the art radiological

Table 8

Summary of Responses Leading to Theme Eight

Student Respondent	Student Responses
R#1	"We need to know the exam before we go into clinical, and then get a lot of hands on. A lot of book knowledge and a lot of practical knowledge."
R#2	"New equipment in the classrooms. I know that our budget probably is very tiny, but the difference between the classroom equipment and the clinical equipment is incredible. We need new equipment for the lab. I think we've got a real good program here."
R#3	"I like what we do, it's you know, one day we go to class, one day we go to clinic, one day we go to class, back and forth, not just doing a whole semester at clinic and a whole semester at class."
R#4	" Patience, having patience, and excitement, and techniques."
R#5	" Not very stressful."
R#6	"Need to cover all of the technical things that you need to know for the registry and what you're going to be using in a clinic. And, still go over what you're going to be needing as far as patient care and the quality of care that you give the patient. Um, and then what you're going to experience in real life. It might help to do some kind of personality thing so that people can kind of learn how people react and act in situations. I think a lot of people probably like to quit, and get, just get out of it because of the way they get treated. Some people don't know how to handle stress very well and don't know how to react to other people."
R#7	" Every thing ties together. I have never been to any other school. Our program has a lot of on-hands and class, which is good. A lot of the classes kind of ties together. It is an exceptional program."
R#8	" Good knowledge of anatomy and technique are very important. I think if you know your anatomy you can get just about any picture."
R#9	"Ability to prepare students for the real world. What am I going to do with physics after school? Focus on the real stuff. I think that our college has a good program."
R#10	"Definitely diversity, not keeping you in class all the time. Techs should be patient and break it down real good to the students. Don't use medical terminology but speak plainly."

Table 8 continued

Summary of Responses Leading to Theme Eight

Student Respondent	Student Responses
R#11	"Having a good concept of what you are doing with the x-ray and the patient. The adjunct faculties are not always available when you want to get your competencies. Make them available"
R#12	"Yes to R#11's comment."
R#13	"I think that the director is the most important part. And, we are so lucky with the director that we have. She is not just our director. She teaches three of our classes. She's not just a director in an office that you go to with problems. She knows, you know, all the positive things that go on too, cause she's right there with us. She is absolutely wonderful and her door is always open, anytime we walk by. And she is so friendly to us outside of this. So, I think that the director is so important in making sure that the professors and the students all get along. Good leadership makes a big difference. And she has also come in and changed a few ways of teaching and you know, doing some things that have really helped me. I hope that it has helped other people too. But I feel, you know, things have been explained, not necessarily in a better way, just a different way."
R#14	"The first thing I would say is having professor X be our instructor because she's very good, and just having a lot of good clinical time with techs that are helpful and intelligent about the field. The way the students approaches clinic, I've seen some students that the tech will tell to do a chest x-ray, and their first reaction is, are you just having me do this because I'm a student. And, you don't want to. Clinic is what you make of it. It's all in your mind. If you want to make it a good environment, where you'll learn, you can do that. If you go in with the attitude that, you know, they're just working us hard because they don't want to do it, I mean, that's..."
R#15	"I think, maybe, more lab time should be allotted, that way, you can see how the x-ray is done more than just, you know, the CD ROM and the book and all that's good, but I'd like to come in and actually see it positioned."
R#16	"You need teachers that are willing to teach and help students to learn. You also need friendly people at the clinic to teach you."

equipment to be installed in college simulation laboratories. This would lessen or help eliminate the difficulties students encounter at the clinical sites in the area of equipment operation or transition from dilapidated equipment at the college to the computerized, technological marvels that characterize hospital examination rooms. Students need more

and continuous simulation laboratories (more hands-on and less CD-ROM viewing) at the college, in addition to a meaningful clinical rotation. Clinical instructors should apply themselves more to effective clinical teaching and supervision of students.

Radiography students also want clinical and didactic instructors to exercise patience and use good modeling behaviors and attitude to create a non-stressful, exciting clinical teaching/learning environment for the development and transmission of radiological skills to students. Students seem to imply that if they are surrounded by friendly and caring instructors, who are able and willing to create for them, an enabling, non-stressful, learning environment, students will apply themselves more fully, and effective teaching and learning will occur.

The readmitted attrition students shared major perspectives concerning their experiences before attrition and after they were readmitted back into the program. The readmitted students believed that the non-caring attitudes of some of their didactic instructors, the lack of good mentoring attitude from some clinical instructors, and the lack of motivation coming from the former program director, produced an atmosphere that was not conducive for effective teaching and learning to occur. The students believed that the coming of the new director was a big blessing to the students and CCUS. The new program director's management style and caring attitude towards students, they said, have helped to revive the program and turn things around. One of the readmitted attrition students (R#13) described the old director's relationship with the students as follows:

The previous director wasn't very student friendly. I mean, it's almost like we were

just in there and we would be gone in a couple of years. He didn't know my name, and it wasn't just with me. It was with the whole class. He was the type of director that was just a director. And he didn't teach as many classes to us. I felt like there wasn't that relationship, that open door where we could go with him you know, ideas and stuff like that. It just wasn't the same. (R#13)

Another readmitted attrition student, Respondent #14, compared the new program director's management style with that of the old director:

Now, comparing style of leadership, night and day. New director is much more positive at the, you know, just the way she presents herself in the classroom. She doesn't just get up there and say, okay, this is this, this is this. She tells you why this is this, you know. And, what you can do to get it to look like this and why you do that. She just explains things much better. The new director is a very caring person, very concerned about what we're going through, how we're doing. Um, from what I could tell about the new director, I get the attitude that you can come into her office at anytime; she will drop what she is doing. The old director would have hesitated to do that. (R#14)

The rest of the readmitted attrition student (R#15, R#16, and R#17) described the problems they encountered at the clinical sites and how things have improved at CCUS since the coming of the new program director. Using his exact words, R#15 stressed the following points:

Well, since Professor X has become our director, I think the classroom has really improved. Um, she is an excellent teacher. The way she presents things has made

me feel more open to asking questions.... My very first week, I was sent down to the Emergency Room by myself, by myself, no supervision. And, I had, like a C & T spine on a motor vehicle accident. So, I called upstairs and I said, "I need some help with this". And they said, "Well, what's the problem?" I said, "We haven't covered spines. I have no clue." So, that was not a good clinical experience. It was very frustrating...At the time I was going through a divorce. That, unfortunately, overshadowed everything else that was going on in my life at the time. And, I think that was a big factor in (dropping out). I missed passing physics by 3 points.... Things are progressing very well. Yeah, very well. Slowly but surely getting all my certifications done. I'm doing much better in class. (R#15)

The next student, Respondent #16 commented as follows:

At clinic, the techs will sit around all day and let you do everything. And if you do not know how to do anything, they will send you there anywhere. Sometimes they are there watching us, but not all the time. In the classroom, two particular teachers have attitude, bad attitude. I think that those two of our teachers want you to fail. They would try basically everything to make you to fail. In my former class, we started with 22. Out of a class of 22, like in a couple of semesters we were down to 12, and that happens just about very year. (R#16)

The fifth readmitted attrition student made the following comments concerning her experiences and relationships with the clinical and didactic instructors:

Well the part that I got out on was the clinic. I didn't pass the clinic, and I was at 'the dreaded clinic' and I had 'the dreaded' instructor from the clinic, and whatever

she wrote down or told people, it's kind of her words against mine. She refused to go down to emergency room to comp me out. We needed a 74 to pass clinic, I got a 70... I will remove two teachers and replace them with teachers that have experience in teaching and have a teaching degree, and the dreaded clinic. Am serious. (R#17)

The above comments reveal a conflict of opinions between the present first-year students and the readmitted attrition students. The majority of the readmitted students expressed negative feelings towards CCUS didactic instructors. These feelings are contrary to the majority feelings expressed by the first-year students. Although some of the first-year students interviewed made negative comments concerning the attitudes of their didactic instructors, the majority of the interviewed first-year students made positive comments concerning the attitudes of the two didactic instructors the readmitted attrition students wanted removed from CCUS.

An interesting thing I noticed while interviewing the readmitted group of five was that they seemed to be energized and very determined to succeed this time around. I had the opportunity to observe them at the affiliated clinics, and I was impressed with their work attitude and the relationships/interactions that existed between them and their clinical instructors. One of the readmitted students (R#13) was highly praised by her clinical instructor for her ability to learn and become highly proficient on how to use the newly installed digital computed imaging equipment.

Chapter V presents the research findings and discusses the answers to the research questions based on the analysis of information or data collected through individual interviews, focus group interviews/discussions, participant observations, and program

records. The chapter summarizes the study with recommendations and implications for practice and further research.

CHAPTER V

DISCUSSION

This chapter restates the research problem and presents a summary of the study. It discusses the major findings and answers to the research questions, based on the analysis of data gathered from clinical site observations, individual interviews, focus group interviews, and program outcome's records on student admissions, attrition, and retention at CCUS. The chapter concludes with some recommendations and implications for practice and further research.

Research Problem and Purpose Restated

There is an acute shortage of radiographers in the United States, and student attrition is one of the major factors contributing to this shortage. The purpose of this study was to determine (from study participants' points of view) what it means to be a first-year radiography student and the factors that contribute to student attrition and retention in radiography education.

Using a qualitative case study methodology, the study examined the clinical and academic difficulties and problems encountered by first year radiography students. It also examined the interactions and relationships that developed among radiography students and between radiography students and didactic faculty, clinical instructors, radiologists, and other radiology department personnel during the first year of radiography professional program. The purpose of these examinations was to determine the effects of these difficulties, problems, interactions, and relationships on didactic and clinical education

(teaching and learning), student retention, and attrition during the first year of professional radiography education.

The researcher believes that this determination would enable radiography programs to find solutions to the educational pitfalls or problems that may contribute to student attrition and other ineffective educational outcomes. An increase in student retention would increase the number of new entrants into the radiography profession and help combat the shortage of registered technologists (radiographers).

Methodology and Methods Used

A qualitative research methodology was used in this study because of the nature of the questions asked. A qualitative approach enabled the researcher to investigate the phenomena studied in their natural setting, in order to determine the perspectives and interpretations of study participants (Denzin & Lincoln, 1994).

A community college in Southwestern United States was used for the study, and the study population consisted of students enrolled in the radiography program at CCUS; radiography students who dropped out in their first year from CCUS between 1999 and 2002; clinical instructors and clinical supervisors/administrators working with radiography students at affiliated clinical sites; radiography program director; and didactic instructors currently teaching radiography students at CCUS. The total number of subjects in the population studied was approximately 104, and all were over 18 year old. Twenty-eight subjects were selected out of this number to participate in the study.

The study conducted a total of 23 individual interviews and two focus group interviews with 28 study participants (see Table II for details). The participants included

four current first-year dropouts; five former first-year dropouts; nine currently first-year students who volunteered to participate in the study; four clinical instructors; three clinical supervisors/administrators; and three CCUS radiography faculty members.

The data sources employed by the researcher to gather information used to answer the research questions included: individual interviews; focus group interviews; clinical site visits and participant observations; and program outcome's file data or records containing information on students' admissions, attrition, and retention at CCUS.

Data Analysis

This involved first, reading of the interview transcripts and field notes extensively as they emerged for good understanding of the issues and situation under analysis. The analysis then advanced into coding, writing memos, noting patterns and themes, clustering and conceptualizing, subsuming particulars into the general, making metaphors, factoring, noting relations among variables, and building logical chains of evidence (Miles & Huberman, 1994).

The emerging themes from the coded interview transcripts, field note summaries, and program outcome's data were put in bins, and the bins were used to construct tree diagrams and folk taxonomies to enable the researcher delineate common themes and themes unique to respondents (Miles & Huberman, 1994). The emerging themes were also used to organize respondents' main points, and these were displayed in data matrixes as summaries and for contrasts and comparative purposes. The findings that emerged from the analysis were examined under the lenses of the surveyed literatures and

theoretical frames of Bandura's (1977) Social Learning Theory and Astin's (1984) Student Involvement Theory to see how they related or differed.

Emerging Themes/Research Findings

Theme One: Student Recruitment in Radiography

Nine out of the 18 students interviewed learned of the radiography field through friends or family members working in radiology or other allied health profession. One student became interested in the field during a ninth grade career class while another student became interested after shadowing (clinical observation of radiographic procedures). Two other students became interested in radiography after having x-ray procedures done on them while another two learnt of the profession while working in the medical field. Two students chose the field as a result of its high job opportunities and remunerations. Only one student out of the 18 interviewed became interested in the radiography profession as a result of familiarity with the program at CCUS. In the student's words, "I grew up in the city and knew that 'CCUS' offered the program. I thought it would be fun, easy, and something that would get me into a stable position".

The fact that none of the students interviewed reported learning about the existence of a radiography career or program through the recruitment efforts or activities of community college under study may not be an indication of poor or lack of recruitment efforts at CCUS over the years. The program had recruitment activities during the time of the former radiography directors and currently it has recruitment activities at some metro high schools and during college-wide career information day (held twice yearly), at heart fair, and at health information day rallies.

My analysis and interpretation is that the 18 students' responses may not be a good reflection or indication of the recruitment efforts at CCUS. The students' responses may reflect that, among the radiography class admitted in 2002, the majority of students interviewed reported that they became interested in the radiography profession as a result of factors other than CCUS recruitment efforts or activities. Although it is difficult to pinpoint all the factors responsible for the decrease in admissions or the number of prospective radiography students at CCUS over the years, a more intense and active recruitment efforts could have helped to increase the awareness of the radiography profession among prospective students and thereby help attract highly qualified students.

The number of prospective students applying for admissions into CCUS radiography program increased in 2003, according to information obtained from CCUS radiography program director. An increase in admissions and student enrollment (and a decrease in student attrition) would help to increase future radiography graduation rates at CCUS and the number of new entrants into the radiography profession from the community college.

Theme Two: A Typical Day in the Life of a First-Year Radiography Student

A typical day at clinic, for a first-year radiography student attending the community college under study, started at 7:00 AM and ended at 3:30 PM. Although some clinical days were slow, the majority of the days were extremely busy and characterized by heavy patient load; fast and slow paced, familiar and unfamiliar, radiographic procedures; lots of observations and hands-on activities; stress; and pressure. It was also characterized by clinical teaching and learning; pleasant and unpleasant interactions with clinical instructors, clinical supervisors, patients, radiologists, and other clinical personnel; thirty

minutes lunch break and limited resting time. A typical day at school began much later (at 9:00 am), and it was characterized by hours of lecture, CD-ROM viewing of radiographic procedures and techniques, clinical and didactic discussions, unit exams, simulation laboratories, and student practice.

In spite of the stress, pressure, heavy patient load, and some unpleasant interactions and relationships that characterized clinical education (according to students' interview responses) a majority of the students interviewed said they enjoyed clinical education better than didactic because of the hands-on activities and patient interactions. Table 4 is a summary of students' responses to interview question #2, "Can you describe to me what your typical day is like as a radiography student, and what kind of activities you do".

Theme Three: Clinical Interactions, Relationships, and Clinical Instructors Attitudes Towards Radiography Education

Interview responses revealed that a majority of the students interviewed identified clinical interactions, relationships, and the attitude of clinical instructors towards radiography education as positive and conducive for effective teaching and learning. However, some of the interactions, relationships, and clinical instructors' attitudes were identified as negative and not conducive for effective teaching and learning. The interactions, relationships, and clinical instructors' attitudes towards first-year students and radiography education in general varied from clinic to clinic and also among students rotating at the same clinic.

A clinical instructor working at one of the affiliated hospitals was classified by the radiography students interviewed as "not student friendly". One first-year students made

the following remarks," All students fear going to this clinic because of her". Some clinical instructors who displayed negative attitudes towards clinical education at the beginning later changed attitudes as clinical rotation progressed. The negative clinical instructors' attitudes frustrated some first-year students and created a non-conducive environment for clinical teaching and learning. This finding identifies with those reported by Kenny, LaBelle, & Miller (2000); Nahas, Nour, & al-Nobani (1999); Daniels & DeVos (1996); Irby (1978); and with Bandura (1977) social learning theory.

Kenny, LaBelle, & Miller (2000) revealed that close student-staff relationship is a key component in effective clinical education. Nahas, Nour, & al-Nobani (1999) reported that the quality of student-teacher interaction in the clinical field could facilitate or hinder student's learning. CCUS radiography students' expectations of their clinical instructors are also in line with the findings reported by Daniels & DeVos (1996) in a national survey of radiation therapy students. The results of the survey indicated that among first, second, and third-year students, the most common expectation was that clinical instructors should take time in answering their questions and in explaining procedures. Irby (1978) also showed that an instructor's availability, accessibility, ability to evaluate/give appropriate feedback to students, and his or her attitude towards students, affect students' motivation and the development of clinical competencies.

Theme Four: Didactic Interactions, Relationships, and Didactic Instructors' Attitudes Towards Radiography Education

Students' responses revealed that, despite the few negative comments concerning the attitude of one didactic instructor, the didactic instructors, and the new program director,

in general, have contributed immensely to helping students progress toward achieving their educational goals. Students reported that the bulk of their motivation came from the new program director. This was highly visible in the attitude of the new program director towards the students, radiography faculty, staff, and program visitors. The motivation coming from the program director, the didactic instructors, and from the students (in addition to other factors) may have contributed to lower the 2002 class attrition rate.

The above findings are in line with Nahas, Nour, & al-Nobani (1999) findings that the quality of student-teacher interaction in a clinical field could facilitate or hinder learning. The findings are also in line with Atack, Comacu, Kenny, LaBelle, & Miller (2000) findings that close student-staff relationships are key factors in the clinical education of nurses.

Theme Five: Typical Problems/Difficulties Experienced by First-Year Radiography Students

Typical problems included: unfamiliarity with the healthcare or clinical environment at the onset of clinical education, which posed initial shock; the bombardment of students with new knowledge, information, or concepts not previously encountered in prior or former education; and nervousness as a result of being closely watched while testing out on competency procedures. Others included stress and pressure as students labored trying to find and complete required clinical competency examinations and make good grades; lack of adequate clinical supervisions experienced by students at some affiliated clinical sites; difficulties manipulating the x-ray machine and coming up with the correct exposure technique factors necessary for producing diagnostic radiographic images; and

transition from out-dated x-ray machines used in college simulation laboratories to the state of the art, computerized radiological equipments used at affiliated clinical sites. Other difficulties included lack of the basic knowledge involved in producing a radiograph; the difficult nature and toughness of radiography program in general; time demand/family obligations; difficulties arising from working with and caring for patients or sick people; lack of good sleep or rest; and lack of adequate finances to meet financial obligations.

Some of the students interviewed worked part time (sometimes close to full time) to support their families while carrying a full load doing the radiography program. As a result, time was a big luxury and there was never enough of it. Radiography programs, in general, are cohort-type programs, and there is no room for part time attendance. All students admitted into the program began the professional courses together and were expected to graduate together and make room for the in-coming cohort.

Theme Six: Didactic and Clinical Personnel Perspectives on Radiography Education

Didactic instructors believed that the admissions criteria enabled the program to admit qualified students who would successfully complete the program, provided these criteria are enforced. However, admitting the best, qualified students into the program may not guarantee zero attrition because there are other factors in play. The faculty believes that clinical instructors should receive formal training on how to work with and evaluate radiography students. The didactic faculty identified several stressors that may have contributed to ineffective educational outcomes in radiography. These stressors were personal problems, family problems, lack of adequate time, financial problems, and

academic problems: the faculty's main goal is to enable students succeed and excel. For this reason, they said they kept an open dialogue with the students and always let them know the faculty was available for them any time they needed to share their problems and difficulties.

The above findings are in line with the literature review on the major barriers to student retention. Tinto (1987) contended that student commitment to educational goal and the institution is central to degree completion. The causes of student attrition, as outlined by Tinto, include: problems adjusting to college or university life, academic difficulties and unwillingness to make academic commitments, lack of clearly defined goals, and uncertainty about career aspirations. Tinto (1987) stressed that an important feature of effective retention program include commitment to students, commitment to education, and clarity of educational missions. The secret to retention, he said, lies in the development of communities that are committed to education.

The barriers identified by the Oklahoma State Higher Education Task Force on Student Retention (2002), fit into five categories. The categories included financial; academic; social, emotional, and personal problems; future expectations/jobs; and student services, enrollment, and advising. Clinical instructors and supervisors are mentors, and according to Bandura (1977), a good mentoring behavior is crucial for learning to occur in a social environment. Astin's theory of student involvement (1984) also talks about instructors motivating students in order to achieve maximum student involvement. Motivation by instructors may foster high degree of student involvement during the learning process.

Clinical instructors reported that they preferred working with first-year students because these students do not have "attitude problems" (are more willing to follow instructions, and are easier to teach than second-year students). Rotating students from one clinic to another posed a big retraining/reorientation problem for clinical instructors. Some of the clinical instructors interviewed stressed that good communications and good inter-personal relationships and interactions between them and students is necessary for effective teaching and learning to occur. They suggested sending representatives to CCUS to talk to the students concerning clinical expectations, responsibilities, and interpersonal relationships during clinical rotations. Clinical instructors also want some feedback on clinical site evaluations done by students. My observations and analysis is that most CCUS clinical instructors are willing to help students learn and develop their imaging skills provided the students are willing to apply themselves.

Theme Seven: Student Attrition and Retention at CCUS

The reasons recorded for student attrition ranged from academic to clinical, personal, and other. Some of the personal reasons that contributed to attrition were identified while some were not. Some students stated that the radiography program turned out to be different from what they had expected it to be. The time demand and the magnitude of work inherent in the didactic courses and clinical rotations were extremely stressful and equivalent to working a full-time, 40 hour-week job.

One of the CCUS instructors interviewed pointed out that, as a result of dwindling number of prospective students applying for admissions over the years, the radiography program admitted less qualified students, and this factor may have contributed to high

attrition rates at CCUS. The interim radiography program director put an end to the practice of admitting students who have not completed all the entry/admission requirements.

Student attrition that occurred at CCUS appeared to be the result of a combination of two or more factors that span across financial problem, job commitments, academic problem (didactic and clinical), family obligations, negative clinical instructors' attitude, loss of interest in radiography, stress, quantity and quality of student involvement or commitment, and inefficient time management. The research findings concerning the factors responsible for student attrition at CCUS appear to be in line with those reported by Astin (1984), Tinto (1987), Thayer (2000), O'Brian & Shedd (2001), and The Oklahoma State Higher Education Task Force on Student Retention (2002).

Theme Eight: Students' Perspectives On Effective Radiography Education

The perspectives shared by CCUS radiography students on the characteristics of effective radiography education enumerated the elements that characterize or define effective radiography education. Effective radiography education was defined by the researcher in chapter one as an educational program that enables radiography students to acquire the knowledge and skills required to successfully complete a radiography program and become certified to practice in the profession.

According to the students, effective radiography education should incorporate state of the art radiological equipment; adequate classroom lectures and simulation laboratories; more hands-on activities; less CD-ROM viewing; and a meaningful clinical rotation. It should incorporate clinical instructors who would apply themselves more, exercise

patience, and use good modeling behaviors and attitude to supervise students. The students stressed that an effective radiography education should incorporate clinical and didactic instructors, who would create a non-stressful, exciting clinical and didactic environment for effective teaching, learning, and the developing of radiographic skills.

The quality and quantity of student involvement (Astin, 1984) among the readmitted group of attrition students went up considerably. These students graduated during the summer of 2003 and become gainfully employed in the radiography profession. Although several factors must have contributed to energize the readmitted attrition students to success, they seemed to believe that the motivational atmosphere created by the new radiography program director, and her leadership style, contributed immensely to turn things around. The teaching and learning atmosphere that existed after the new director came (they said) was very conducive for academic success, and this motivated them to become resolved and determined to succeed in their academic pursuit.

The radiography students' belief that the motivational atmosphere created by the new program director at CCUS contributed immensely to their success may be evidence that motivational processes could create a strong sense of efficacy that may enhance human performance and accomplishments (Bandura, 1994).

Research Questions Revisited

This study asked the following questions.

Focus question:

What is it like to be a first-year radiography student, and what factors contribute to student attrition and retention in radiography education?

The focus question and sub-questions were answered using the information gathered from individual interviews, focus group interviews, clinical observations, program outcome's data, and the emerging themes.

According to Guba (1990), reality can never be comprehended fully; but it can only be approximated. The answers to the focus and sub-questions given below are but one of many that could be constructed from the interviews, clinical observations, and program records at CCUS. Therefore, I do not make any claims that these answers are the absolute "Truth" or absolute answers to the research questions.

Sub questions #1

What factors inspire or influence prospective students to major in radiography?

The factors that inspired or influenced the prospective students interviewed to major in radiography at community college under study included the following: friends/family members working in radiography and other allied health profession; career class; clinical observation (shadowing) and/or exposure to and knowledge of the health professions; high radiography job opportunities; and remuneration (the almighty dollar). Although several factors inspired/influenced prospective students to major in radiography, nine out of the 18 students interviewed were influenced or inspired by friends or family members working in radiography and other allied health fields.

Responses from 18 students may not be a good reflection or indication of the recruitment efforts at CCUS. The above information mainly reflects that, among the radiography class admitted in 2002, the majority of students interviewed reported that they were inspired or influenced to major in the radiography profession by factors other

than recruitment efforts or activities of CCUS.

Sub-Question #2

What is it like to be a first-year radiography student during the initial and subsequent semesters of academic and clinical education rotation?

The initial semester was characterized by information overload of new, unfamiliar, and difficult concepts; shock and unfamiliarity with the hospital environment; stress and pressure arising from long hours spent in the classroom, simulation laboratories, and clinical rotation at affiliated hospitals and clinics; and questioning oneself whether the right choice of profession or career was made. Although things stabilized later on into the semester, the majority of the clinic days that followed were extremely busy and characterized by heavy patient load; fast and slow paced, familiar and unfamiliar, radiographic procedures; lots of observations and hands-on activities; stress; pressure; pleasant and unpleasant interactions with clinical instructors, clinical supervisors, patients, radiologists, and other clinical personnel; clinical teaching/learning; 30 minutes lunch-break and limited resting time.

In spite of the stress, pressure, heavy patient load, and some unpleasant interactions and relationships that characterized clinical education (according to students' interview responses) a majority of the students interviewed said they enjoyed clinical education better than didactic because of the hands-on activities and patient interactions. Classroom activities, they said, was long, boring, and sometimes filled with lots of CD-ROM viewing that sent them to sleep. They wanted less CD-ROM and more hands-on activities in simulation laboratories, like they had during the first eight weeks.

Sub-Question #3, #4, and #5

These three questions are closely related, and students' interviews provided combination of responses that tended to address them together. Sub-questions 3, 4, and 5 were asked as follows:

3. What academic, social, and other difficulties do radiography student's experience during the first year of didactic and clinical education?
4. What is the nature of the interactions and relationships that develop during the first year among radiography students and between radiography students and didactic instructors, clinical instructors, radiologists, and other radiology department personnel?
5. What are the effects of the above interactions, relationships, and difficulties on didactic and clinical education (teaching and learning)?

The academic, social, and other difficulties encountered by first-year radiography students included: unfamiliarity with the healthcare or clinical environment, which posed initial shock; students being bombarded with new knowledge, information, and concepts not previously encountered in prior or former education; nervousness as a result of being closely watched sometimes while testing out on competency procedures; stress and pressure as students labor trying to find and complete required clinical competency examinations and make good grades; lack of adequate clinical supervisions experienced by students at some affiliated clinical sites; difficulty manipulating the x-ray machine and coming up with the correct exposure and technique factors necessary for producing a diagnostic radiographic image; transition from out-dated x-ray machines used in college

simulation laboratories to the state of the art, computerized radiological equipments used at affiliated clinical sites. Other difficulties included initial lack of basic knowledge involved in producing a radiograph; the difficult nature and toughness of radiography program in general; time demand; difficulties arising from working with and caring for severely sick patients; lack of good sleep or rest; lack of enough time to complete assignments; and lack of adequate finances.

Majority of the students interviewed characterized clinical interactions, relationships, and the attitude of clinical instructors towards radiography education as positive and conducive for effective teaching and learning. However, some of the interactions, relationships, and clinical instructors' attitudes were identified as negative and not conducive for effective teaching and learning. The interactions, relationships, and clinical instructors' attitudes towards first-year students and radiography education in general varied from clinic to clinic and also among students rotating at the same clinic.

Despite a few negative comments concerning the attitudes of didactic instructors, a majority of the students interviewed believed that the didactic instructors and the new program director, in general, have contributed immensely to helping students progress toward achieving their educational goals. Students reported that the bulk of their motivation came from the new program director.

Sub-Question # 6

What are the similarities and differences in the educational experiences of male, female, minority, and Caucasian radiography students during the first year of didactic and clinical education?

There was no perceived differences in the educational experiences of male, female, minority, and Caucasian radiography students during the first year of didactic and clinical education. All students seem to have been treated relatively the same, both at clinic and in the classroom. None of the minority students interviewed complained of being treated differently as a result of their race or color.

Three out of the 18 students in CCUS first-year radiography class were minority students (two blacks and an Indian). The rest were white or Caucasian students. The total number of students that dropped out of the first-year class was four, and they consisted of one black female, an Indian female student, and two white female students. The black and Indian female students dropped out as a result of academic difficulties (they failed a radiographic physics course) while the two white female students dropped out as a result of personal problems (they lost interest in the radiography program).

Thayer (2000) emphasized the retention of first generation students and students from low income backgrounds in his study because these groups of students are among the least likely to be retained through degree completion. Szelenyi (2001) looked at the issue of minority students' retention and academic achievement in community colleges. According to Szelenyi, minorities tend to have lower persistence and lower academic preparedness for higher education. Although two out of the three first-year minority students enrolled at CCUS radiography program dropped out as a result of academic problems we cannot conclude from this incidence that the attrition was due to lower academic preparedness for higher education. A look at minority students' attrition at

CCUS over several years and their academic preparedness would shed a brighter light and enable the researcher to provide a more valid answer to this research question.

Sub-Question #7

What are study participants' recommendations for improving the effectiveness of radiography education?

The students recommended the incorporation of the following in radiography education: state of the art radiological equipment in didactic education and simulation laboratory; adequate classroom lectures and simulation laboratories; more hands-on activities; less CD-ROM viewing; and a meaningful clinical rotation. They recommended the employment of qualified didactic instructors who have earned an education/teaching degree in addition to their radiography degree. Students recommended the utilization of clinical instructors, who would apply themselves more, exercise patience, and use good modeling behaviors and attitude to supervise students. They want didactic and clinical instructors who would create a non-stressful, exciting classroom and clinical environment for effective teaching, learning, and the developing of radiographic skills.

The researcher believes that the participants' responses discussed above, the themes that emerged during the analysis, and the answers to the sub-questions stated above provide the answer to the focus question, "What is it like to be a first-year radiography student, and what factors contribute to student attrition and retention in radiography education?

In a nutshell, a typical first-year radiography student is unfamiliar with the hospital or clinical environment and the demands of working in the healthcare profession. At the

inception of the professional courses, a first-year radiography student is enveloped by information overload of new, unfamiliar, and sometimes difficult concepts. The student may pass through a long period of adjustment and acclimatization and may question and continue to question oneself whether the right choice of profession or career was made. He/she may adjust quickly and develop a strong liking for the profession or may continue to experience shock, stress, and pressure as a result of working with sick people; personality clash or difficulties interacting with clinical personnel; long hours spent in the classroom, simulation laboratories, and clinical rotation at affiliated hospitals and clinics; and the demands of the profession. Following exposure to didactic and clinical education, the student may persist and continue in the program or decide to drop out.

Student attrition in radiography education appears to be a combination of several factors that span across academic difficulties (didactic and clinical), financial problems, personal and family problems, job commitments, family obligations, negative didactic and clinical instructors' attitude, personality clash, loss of interest in radiography, stress, the quantity and quality of student involvement or commitment, and inefficient time management. The factors that appear to increase student retention in radiography education include the following: academic readiness, didactic and clinical faculty dedication and commitment to education, student interest in radiography, motivation and commitment to educational goals, efficient time management, family commitment, availability of resources, and a conducive/enabling teaching and learning environment.

Implications for Practice

This study looked at what it is like to be a first-year radiography student and the

factors that contribute to student attrition and retention in radiography education. The research examined the interactions and relationships that developed among radiography students and between radiography students and didactic faculty, clinical instructors, radiologists, and other radiology department personnel during the first year of radiography professional program. The purpose of these examinations was to determine the effects of the difficulties, problems, interactions, and relationships on didactic and clinical education (teaching and learning), student retention, and attrition during the first year of professional radiography education.

The researcher recommends that the findings of this study should be shared with both didactic and clinical instructors involved in the education of radiography students. This will enable them become aware of what radiography students experience during the first year of the professional program, what it means to be a first-year radiography student. Clinical and didactic instructors occupy an important position in the education of radiographers. Of all the barriers to effective radiography education students identified, the teaching and learning environment and the attitude of instructors were highly stressed as factors that affected students the most. A non-conducive environment and negative instructors' attitudes appear to inhibit teaching and learning. A conducive environment appears to promote meaningful teaching and learning.

The implication here is that didactic and clinical instructors should strive to create an enabling learning environment for students placed under their charge. Clinical instructors should receive periodic training on how to relate to, instruct, and evaluate radiography students in the clinical environment. This would increase the effectiveness of

radiography education.

The findings of this study could enable other radiography programs to find solutions to similar didactic and clinical education pitfalls that increase student attrition in their institution. This would enable radiography programs to increase student retention, the supply of radiographers, and combat the shortage of radiographers that exist in the field. All these would enhance practice in the radiography profession.

According to Bandura (1977),

> Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action. (p22).

The implication here is that without good mentoring, guidance, and adequate supervision by clinical and didactic instructors, the learning of imaging skills would be laborious and radiography student would be endangering the health of patients and coworkers. Ionizing radiation could produce adverse health effects on irradiated tissue if the wrong exposure technique factors are utilized. The inappropriate use of ionizing radiation could lead to adverse somatic effects, which is manifested on the individual irradiated or adverse genetic effect, which could be manifested in future generations (Bushong, 2001).

Implications for Research

The findings of this study may shed more light or add new contribution to the established theories of student attrition. It may also lead to the development of a new

theory of student attrition peculiar to radiography and other allied health professions that incorporate didactic and clinical education activities in professional education, a theory that would help explain how didactic and clinical education interactions, relationships, and other factors influence the teaching and learning of radiography skills or contribute to student retention and attrition.

This study looked at student attrition overtime in a single institution. As a result of the limited number of subjects used in the study, the results or findings may not be generalized to other institutions. The researcher recommends that similar studies should be conducted using several radiography programs, a quantitative or qualitative methodology, and larger number of subjects. This will give a more valid result on what it means to be a radiography student and the factors that contribute to student attrition and retention.

The researcher also recommends that studies be conducted on what it means to be a radiography clinical instructor using a larger population of clinical instructors and larger sample size. This will help determine the difficulties and problems clinical instructors encounter as they incorporate clinical education demands with the demands of their jobs. Studies should also be conducted to determine clinical instructors' perspectives on effective clinical education in radiography or the effects of clinical education on quality patient care in medical imaging.

Conclusion and Recommendations

Student attrition is one of the major factors contributing to the decrease in the number of new entrants into the radiography profession and the shortage of radiographers.

The findings of this study suggest that a typical first-year student may pass through long period of adjustment during which time he/she may question and continue to question oneself whether the right choice of profession or career was made. Although a majority of first-year students eventually adjust and develop a strong liking for the profession, some students may continue to experience increased stress and pressure as a result of working with sick people; personality clash or difficulties interacting with clinical personnel; long hours spent in the classroom, simulation laboratories, and clinical rotation at affiliated hospitals and clinics; and the demands of the profession.

The study findings also suggest that radiography student attrition may not necessarily be caused by a single factor but may be the result of combinations of factors. These factors may include: financial problems; job commitments; academic problems (didactic and clinical); family obligations; negative clinical and didactic instructors' attitudes; loss of interest in radiography education; stress; the quantity and quality of student involvement or commitment; and inefficient time management.

A majority of the students interviewed characterized clinical interactions, relationships, and the attitude of clinical instructors towards radiography education as positive and conducive to effective teaching and learning. However, some of the interactions, relationships, and clinical instructors' attitudes were identified as negative and not conducive for effective teaching and learning. Student motivation, the attitudes of instructors, and program director's leadership style were shown in this study to play important role in teaching, learning, and student retention.

Respondents' perspectives and participant observations reveal that first-year students

in general, admire didactic and clinical instructors who are friendly, patient, knowledge-able, able to teach and answers questions, and allow them to do more hands-on activities (radiographic exams). Students admire an instructor who is personal, caring and not intimidating; one who sets relatively high standards and doesn't joke around.

The researcher recommends that didactic instructors, clinical instructors, and other personnel involved in the education of radiography students should motivate students and strive to create an enabling, non-stressful environment for the teaching, learning, and the development of radiography skills. This will help decrease student attrition, increase the number of new entrants into the radiography profession, and combat the shortage of registered radiologic technologists in the United States.

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APPENDICES

APPENDIX A

Individual Interview Protocol for Non-Dropout Students

1. What sparked your interest in radiography, and why did you decide to major in it?
2. Can you describe to me what your typical day is like, as a radiography student, and what kind of activities you do?
3. Which aspect of radiography education (didactic or clinical) do you enjoy the most, the least, and why?
4. What sort of interactions or relationships exists between you and clinical personnel, and how do these interactions or relationships affect clinical teaching and learning?
5. What sort of interactions or relationships exists between you and didactic faculty, and how do these interactions or relationships affect teaching and learning?
6. Can you relate to me a clinical and/or didactic education experience that was rewarding and beneficial to your education? Why was it beneficial?
7. Can you relate to me a clinical and/or didactic education experience that was not beneficial to your education? Why was it not beneficial?
8. What difficulties or problems did you encounter during clinical/didactic education, and how did they affect the teaching and learning of radiography skills?
9. What characteristics/qualities do you admire in your:
   a. Clinical Instructors? Why? b. Didactic instructors? Why?
10. What characteristics or qualities do you loathe (dislike) in your:
    a. Clinical Instructors? Why? b. Didactic instructors? Why?
11. How would you define effective radiographic education?
12. Did your program and experiences as a radiography student during the fall and spring semester meet your definition of effective radiography education? Explain!
13. If you were to change/redesign any aspect of radiography education, what will it be? Why?
14. Do you have any other comment or point you would like to make?

APPENDIX B

Individual Interview Protocol for Students that Dropped Out

1. What sparked your interest in radiography, and why did you decide to major in it?
2. Can you describe to me what your typical day was like, as a radiography student, and what kind of activities you did?
3. Which aspect of radiography education (didactic or clinical) did you enjoy the most, the least, and why?
4. What sort of interactions or relationships existed between you and clinical personnel, and how did these interactions or relationships affect clinical teaching and learning?
5. What sort of interactions or relationships existed between you and didactic faculty, and how did these interactions or relationships affect teaching and learning?
6. Can you relate to me a clinical and/or didactic education experience that was rewarding and beneficial to your education? Why was it beneficial?
7. Can you relate to me a clinical and/or didactic education experience that was not beneficial to your education? Why was it not beneficial?
8. What characteristics/qualities did you admire in your clinical/didactic instructors? Why?
9. What characteristics or qualities did you loathe (dislike) in your clinical and didactic instructors? Why?
10. How would you define effective radiographic education?
11. Did the program and your experiences as a radiography student meet your definition of effective radiography education? Explain!
12. Why did you decide to drop out of the radiography program?
13. If you were to change/redesign any aspect of radiography education, what will it be? Why?
14. Do you have any other comment or point you would like to make?

APPENDIX C

Focus Group Interview Protocol for Non-Dropout Students

1. What sparked your interest in radiography, and why did you decide to major in it?
2. What is your typical day like, as a radiography student, and what activities do you do?
3. Which aspect of radiography education do you enjoy the most and the least? Why?
4. What difficulties do you experience as a radiography student?
5. What sort of interactions or relationships exists between you and clinical personnel, and how do these interactions or relationships affect clinical teaching and learning?
6. What sort of interactions or relationships exists between you and didactic faculty, and how do these interactions or relationships affect teaching and learning?
7. Can you relate to me a clinical and/or didactic education experience that was rewarding and beneficial to your education? Why was it beneficial?
8. Can you relate to me a clinical and/or didactic education experience that was not beneficial to your education? Why was it not beneficial?
9. What characteristics/qualities do you admire in your clinical and didactic instructors? Why?
10. What characteristics or qualities do you loathe (dislike) in your clinical and didactic instructors? Why?
11. How would you define effective radiographic education?
12. Did your program and experiences as a radiography student during the fall and spring semester meet your definition of effective radiography education? Explain!
13. If you were to be asked to change or help redesign any aspect of radiography education in this institution that would help reduce student attrition, what will it be, and why?
14. Do you have any other comment/point you would like to add to what we have discussed?

APPENDIX D

Clinical Instructors Interview Protocol

1. Why did you decide to become a clinical instructor?
2. Did you receive any training on how to work with/evaluate students when you became a clinical instructor? If yes, please describe briefly the nature of the training.
3. How are you assigned to work with students?
4. What is your typical day like as a clinical instructor, and what activities do you do?
5. What is it like to work with/instruct first-year students during the first and second semester?
6. What difficulties or problems do you see or experience while working with or instructing first-year students, and how do these affect clinical teaching and learning?
7. What sort of interactions or relationships exists between you and first-year students, and how do these interactions or relationships affect clinical teaching and learning?
8. How is your instruction evaluated, and do you get any feedback after the evaluation?
9. If you were to be asked to change any aspect of radiography education (clinical or didactic), in this institution and affiliated clinical sites, in order to reduce student attrition and increase retention, what will it be, and why?
10. Do you have any other comments?

APPENDIX E:

Radiography Program Director/Clinical Coordinator's Interview Protocol

1. What is your typical day like as a radiography program director (or clinical coordinator)?
2. From your experiences working with first-year students, do the admission criteria and requirements in use enable the program to admit qualified students who are academically prepared to pursue/successfully complete an associate degree in radiography? Elaborate.
3. What criteria do you use to recruit or assign clinical instructors to work with students?
4. Do you look at or consider the educational background or experiences of clinical instructors in terms of teaching?
5. Do clinical instructors receive training on how to work with and evaluate students? If yes, please describe briefly the nature of the training and when they are given.
6. Are clinical instructors evaluated periodically and given feedback after each evaluation?
7. What are the typical problems/difficulties faced by first-year radiography students in didactic or clinical education, and how do these affect teaching and learning?
8. If there are problems with clinical instructional methods or the attitudes of clinical instructors towards students what do you do?
9. What factors contribute or have contributed to student attrition in your program?
10. Which factor or factors contribute or have contributed the most? Explain!
11. Does your program/college have interventions or strategies in place for combating factors that contribute to student attrition? If yes, please describe these interventions/strategies.
12. If you were to be asked to change any aspect of radiography education in your institution in order to reduce student attrition and increase retention, what will it

be, and why?

13. Do you have any other comments?

APPENDIX F:

Didactic Instructors' Interview Protocol

1. Would you briefly describe the duties/roles of a radiography instructor or professor?
2. What is your typical day like as a radiography instructor or professor?
3. From your experiences working with first-year students, do the admission criteria and requirements in use enable the program to admit qualified students who are academically prepared to pursue and successfully complete an associate degree in radiography? Elaborate.
4. What difficulties or problems do first-year radiography students experience in the classroom?
5. What aspect of radiography education (didactic or clinical), in your opinion, poses the most problems or difficulties that could lead to student attrition? Explain.
6. What factors contribute to or have contributed to student attrition in your radiography program?
7. Which factor or factors have contributed the most?
8. Does your program/college have interventions or strategies in place for combating factors that may lead to student attrition? If yes, describe these interventions or strategies.
9. If you were to be asked to change any aspect of radiography education in your institution in order to reduce student attrition and increase retention, what will it be, and why?
10. Do you have any other comments?

APPENDIX G:

Clinical Supervisor/Administrator's Interview Protocol

1. What is your typical day like supervising clinical instructors and students?
2. How do you assign clinical instructors to work with students?
3. Do you look at or consider the educational background or experiences of clinical instructors in terms of teaching?
4. Are clinical instructors evaluated periodically and given feedback after each evaluation? Explain.
5. What are the typical problems/difficulties faced by clinical instructors and first-year radiography students during clinical education?
6. Do these problems or difficulties influence the teaching and learning of radiographic skills or contribute to student attrition? Explain.
7. If there are problems with clinical instruction or the attitudes of clinical instructors towards students what do you do?
8. If you were to be asked to change any aspect of radiography education in your institution in order to reduce student attrition and increase retention, what will it be, and why?
9. Do you have any other comments?

Oklahoma State University
Institutional Review Board

Protocol Expires: 11/25/2003

Date: Monday, December 02, 2002 IRB Application No ED0342

Proposal Title: RADIOGRAPHY EDUCATION IN COMMUNITY COLLEGE: A STUDY OF FRSHMAN STUDENT RETENTION/ATTRITION

Principal Investigator(s):

Francis Ozor
PO Box 17594
Oklahoma City, OK 73136

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact Sharon Bacher, the Executive Secretary to the IRB, in 415 Whitehurst (phone: 405-744-5700, sbacher@okstate.edu).

Sincerely,

Carol Olson, Chair
Institutional Review Board

2

VITA

Francis Chukwuma Ozor

Candidate for the Degree of

Doctor of Education

Thesis: RADIOGRAPHY EDUCATION IN COMMUNITY COLLEGE: A STUDY OF FIRST-YEAR STUDENT ATTRITION AND RETENTION

Major Field: Higher Education

Biographical:

Education: Graduated from Community High School Ezillo, Ishielu Local Government, Ebonyi State, Nigeria in Nov. 1972; received Bachelor of Science degree in Biology, with minor in Chemistry, from Henderson State University, Arkadelphia, Arkansas in May, 1981; received Master of Public Health degree in Health Administration from the University of Oklahoma health Sciences center, Oklahoma City, Oklahoma in December 1991; received Associate of Applied Sciences degree in Radiologic Technology from Rose State College, Midwest City, Oklahoma in May, 1991; received Master of Education degree in Health Occupations Education from the University of Central Oklahoma, Edmond, Oklahoma in May, 1991; Completed requirements for the Doctor of Education degree with a major in Higher Education at OSU, December, 2003.

Experience: Program Director/Associate Professor, Radiography, Bacone College, Muskogee, Oklahoma, August, 2003 to present; Assistant Professor, the University of Oklahoma Health Sciences Center, OKC, January, 1994 to July, 2003; Professor of Radiologic Technology, Rose State College, Midwest City, Oklahoma, 1992 to 1993; Adjunct Professor of Radiologic Physics, Bacone College, Muskogee, Oklahoma, Spring 1996 to Summer, 2003; Surgical Radiologic Technologist, Integris Baptist Medical Center, OKC, 1991 to 2003.

Professional Membership: American Society of Radiologic Technologists; Oklahoma Society of Radiologic Technologists; Central Oklahoma Society of Radiologic Technologists.