# RADIOLOGY STUDENTS' ATTITUDE TOWARD LEARNING COMMUNICATION SKILLS: IMPACT OF CLINICAL EDUCATION

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**Abstract**

The effect communication has on a patient's healthcare experience has received increased attention in the past few decades. As a result, a larger emphasis on communication training is being incorporated into the curriculum of healthcare education programs. A student's attitude toward learning communication skills largely determines the adoption of those skills. The radiologic technologist is a vital member of the healthcare team, yet little research has been done on their attitude toward learning communication skills. A quantitative cross-sectional study was conducted to determine the impact clinical education has on the attitude radiology students have toward learning communication skills. A total of 236 radiology students completed the Communication Skills Attitude Scale (CSAS) at various stages of training. Four additional open-ended questions explored the communication differences found in classroom training and those being modeled in clinics. Results showed there is an initial increase in attitude toward learning communication skills once students start clinical training which then decreases as they gain more experience. Students indicated interpersonal behaviors such as empathy and listening are part of good communication skills. However, procedural communication is most modeled in clinics. Consistent with the theory of situated cognition that knowledge cannot be separated from doing, students indicated the clinical environment and supervising technologists are most influential to the development of students' communication behaviors.

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## CHAPTER 1: Introduction

For the past few decades, a growing emphasis has been placed on the development of communication skills for healthcare professionals (Silverman, 2009). It was Schwartzstein (2015) who asked, "Would you prefer your doctor to be smart or an empathetic communicator?"(p.1586). Increasingly, in today's healthcare, the answer is both. Effective communication is the cornerstone of patient-centered medicine (Taveira-Gomes, Mota-Cardoso, & Figueiredo-Braga, 2016). Effective communication includes verbal and non-verbal skills. Non-verbal communication is known as interpersonal skills or, as commonly referred to in medicine, bedside manners. This includes elements such as empathy, listening, posture, eye-contact, or tone of voice, all of which factor into effective communication and have been linked to patient satisfaction (Bachmann, Roschlaub, Herendza, Kleim, & Scherer, 2017).

The emphasis on having a more satisfied patient precipitated a shift from an illness-centered model of communication to a patient-centered model (D'Agostino & Bylund, 2014). This shift in focus is transforming healthcare from a seller to a consumer market, which uses patient satisfaction as a key component to the definition of quality (Lang, 2012). It has been shown that patients remember their personal treatment and interpersonal communication they received from their healthcare provider more than their clinical or technical quality of care (Ruben, 2016). This consumerism mentality to healthcare changes the view of the patient from a passive, detached, and dependent consumer of services to being engaged, thoughtful, and influential healthcare partners (Ruben, 2016).

The stronger emphasis placed on the patient's experience has been heightened with the implementation of the 2008 Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS). The HCAHPS is a survey given to patients soliciting feedback on their

hospital experience. There are 27 items in the survey which include communication with doctors, communication with nurses, responsiveness of hospital staff, cleanliness of the hospital environment, quietness of the hospital, pain management, communication about medicines, discharge information, overall hospital rating, and recommendations (Centers for Medicare Services, 2017). Receiving poor survey results can influence Medicare funding in a decrease of up to 2% in factors such as those found within the hospital's Value-Based Purchasing Program (VBP) (Medicare Learning Network, 2017). Survey results have begun to show the reason why there is a more concerted effort to bolster communication skills:

> When you consider that the majority of patients measure quality on how well they were treated in the hospital rather than the actual treatment's success, it has never been more important for hospitals to develop a culture where quality measures such as interpersonal and communication skills, are deemed of equal importance to diagnostic, analytical and therapeutic skills. (Brimmer, 2014, p.1)

Despite this knowledge, a study by Angus et al., (2014) on the skills of internal medicine physicians shows that interns lacked a standard set of skills expected from their supervisors, including effective communication skills. In areas specific to radiology, it is challenging to identify the patient-centered practices that relate to the key areas of the patient's experience in using the HCAHPS (Salazar, Quencer, Aran, & Abujudeh, 2013). However, it is common practice that radiology departments use HCAHPS scores as a tool to emphasize the importance of having proper communication practices.

**Background and Statement of the Problem**

Communication skills rank as the most or the second most desired skill in most industries including healthcare (Rapacon, 2015). However, studies have shown new graduates lack the

communication skills that employers are seeking (Bauer-Wolf, 2018; Soule & Warrick, 2015). In some cases, up to 60% of employers indicated their applicants lack communication and interpersonal skills (White, 2013). This concern is compounded by the fact that according to the applicants, they do possess these skills. It has been shown that 80% of students felt they were proficient in communication while only 42% of employers agreed (Bauer-Wolf, 2018). Healthcare is a popular profession and estimated to grow 18% between 2016 and 2026 adding more jobs than any other occupational group (U.S. Bureau of labor and statistics, 2018). The need to develop communication skills in future healthcare workers must be a priority for healthcare educational programs.

Healthcare communication research is dominated by physicians and nurses. While this can provide a general perspective on communication models, it does not factor in the specifics that are needed for other disciplines. Radiology is a profession that may not fit with the traditional communication models. Patients' perspective of radiology is largely based on their quality of service that is provided during and after an examination (Doshi, Somberg, & Rosenkrantz, 2016). Radiologic technologists (RT) have different responsibilities than physicians and nurses and therefore have different problems. According to Bensing, Dulmen, and Tates (2003), "Different problems ask for specific tools, and thus for specific communication strategies and behaviors" (p.29). Studying communication in context to specific disciplines will aid in identifying what each healthcare provider views as their individual task and responsibility (Bensing et al., 2003). These differing tasks may involve communication techniques different from the generally accepted models.

There are over 330,000 radiologic technologists in the United States who perform medical imaging and radiation therapy procedures (American Registry of Radiologic

Technologists, n.d.). Medical imaging procedures involve modalities such as X-ray, Computed Tomography (CT), Magnetic Resonance Imaging, (MRI), Nuclear Medicine, Radiation Therapy, and Ultrasound. These modalities are used in areas such as mammography, interventional radiology, cardiac catheterization, and bone densitometry. Despite the widespread knowledge of these modalities, the identity of a technologist is not well known to patients who may confuse them as nurses (Murphy, 2001). Radiology differs in its responsibilities compared to other healthcare fields, not only in the services it provides, but also with the level of patient care.

The RT is directly involved with patient care daily. However, radiography has been referred to as a "hit and run" career due to the short amount of time technologists spend with their patients (Reeves & Decker, 2012). This minimal time spent with the patients has shown that RTs can then distance themselves from patient emotions. The result is more of a focus on the image than the patient (Reeves & Decker, 2012). While the responsibilities of the RT differ from other professions, the need to possess effective communication skills are still crucial. Unlike nursing and other healthcare professions, there have been few attempts to develop theories or models for radiology. Those that have been developed do not apply to the realities of the field (Reeves & Decker, 2012). In order to integrate radiology into the larger healthcare conversation, more research specific to technologists should be done.

A radiology educational program's curriculum includes theoretical communication concepts in its formal didactic courses; however, the practical application of these skills is found in the clinical education component. In clinics, students work with technologists and interact with patients. Communication is a recognized skill for radiology programs. Those accredited by The Joint Review Committee on the Education of Radiologic Technology (JRCERT) are required to assess communication for its accredited radiology programs (JRCERT, 2018). Many

healthcare programs, including radiology, dedicate curricular time in didactic courses to communication theory. However, other healthcare disciplines have indicated a gap between the formal didactic training and the informal real-world practice seen in clinics. This concept is known as the hidden curriculum (Silverman, 2009). This is not a new concept and one reinforced by Van Weel-Baumgarten (2016), "Teaching is not the same as learning everything that has been taught and does not necessarily mean that it can be applied in clinical practice" (p.1443).

Despite the importance of having effective communication skills, the skills gap and hidden curriculum bring into question the effectiveness of the way communication is taught. Understanding why a healthcare worker may lack communication skills can be traced to their attitude toward acquiring these skills while in an educational program. A healthcare student's attitude toward communication skills training likely influences their perception of how important it is and affects the adoption of these skills in the clinical setting (Wright et al., 2006). There is evidence that the positive attitude for learning communication skills declines when comparing pre-clinical education to post-clinical. However, negative attitudes toward communication skills training have also been shown to decrease the longer they were in clinics (Cleland, Foster, & Moffat, 2005). The explanation for this apparent discrepancy is that when students have more patient contact, students understand the relevance of communication (Cleland et al., 2005). While there is extensive research done on the attitude of learning communication skills in various healthcare disciplines, to date, there have been none performed on the RT as indicated from the literature search.

**Purpose of Study**

Effective communication is essential to the professionalism of a technologist. Many healthcare programs, including for those RTs, place communication skills training in the pre-

clinical years (Suojanen et al., 2018). Previous research shows communication skills are best developed during clinical education by watching their instructors interact (Rosenbaum & Axelson, 2013). Along with the real-world impact, the attitude a student has toward learning communication skills is associated with their perception of the importance of these skills, and in turn, influences their behavior (Woloschuk, Harasym, & Temple, 2004; Wright et al., 2006). Having an understanding of the students' attitude toward learning communication skills can have important consequences for the curricular design of radiology programs. Despite the importance of attitudes, research regarding radiology students' attitudes toward this development is lacking. Discrepancies between didactic theory and clinical application of communication are well documented in many healthcare disciplines but are rarely studied in radiology.

The purpose of this quantitative cross-sectional survey study is to examine radiology students' attitudes toward learning and development of communication skills and to determine if clinical education influences students' attitudes. In addition, this study explores the existence of a hidden curriculum related to the teaching of radiology communication.

**Research Questions**

The following research questions guided this study:

1. What are the attitudes of radiology students toward learning communication skills based on clinical experience?
2. What are the attitudes of radiology students toward learning communication skills based on selected demographics?
3. What are radiology students' perceptions of classroom teaching and clinical modeling of communication?

## Theoretical Framework

The theory of situated cognition provided the framework for this study. Situated cognition, also referred to as situated learning, arose from studies conducted in the late 1980s on cognition. Situated cognition is, according to Brown, Collins, and Duguid (1989), a theory where, "Knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used" (p.32). It is a theory that argues information exists not before but comes from the interactions situated in a social context (Roth & Jornet, 2013). Situated cognition is rooted in the idea that knowledge cannot be separated from doing. Through participation in authentic activities, abstract knowledge is transformed into practical. Authentic activities are found in an environment that shares important aspects of the real world that include complex goals and collaboration between learners and practitioners (Artino, 2013). The role of the teacher within the environment is one of a facilitator who models behavior and acts as a coach by providing feedback and advice (Onda, 2012). Ignoring the practical benefits of the situated nature in cognition contradicts the nature of education in providing usable and robust knowledge (Brown et al., 1989).

The concept of situated cognition contrasts the emphasis found in traditional higher education, which is to extract essential principles and abstractly teach them. This results in knowledge that does not apply to real-life problems (Herrington & Oliver, 2000). Being proficient in a profession has as much to do with being part of the culture of practitioners as it does with being technically skilled (Onda, 2012). Through situated cognition, each community is different and constructs its practices, meanings, identities, and beliefs through shared activities (Brown et al., 1989). While this may differ from the typical pedagogical design of higher education, the idea that knowledge and doing are interrelated is not new. The idea that

knowledge cannot be separated from doing has been touted by educational theorists. It was Dewey (1916) who said, “Give the pupils something to do, not something to learn, and the doing is of such a nature as to demand thinking, learning naturally results” (p.181). Figure 1 illustrates the relationships between activity, context, and culture (Brown et. al., 1989).

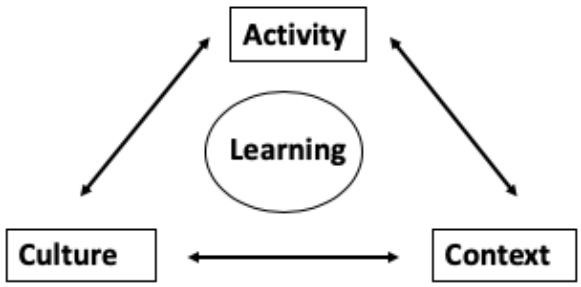


*Figure 1*. Theoretical framework of situated cognition

An important perspective in situated cognition is, according to Brown et al., (1989), “The activities of communities are unfathomable unless they are viewed from within the culture” (p.36). It is not enough to study how to become a healthcare professional from a textbook. A student must be exposed to the healthcare culture so they may understand how to effectively manage the complex relationships within. This is done through clinical training which is the heart of any medical education (Steinert, Basil, & Nugus, 2017). Only through participation in authentic activities can a student acquire relevant jargon, imitate behavior, and act in an appropriate manner of the social group (Brown et al., 1989).

Studies have shown the effectiveness of using situated cognition and the learning methods in cognitive apprenticeships in a variety of healthcare programs (Lyons, McLaughlin, Khanova, & Roth, 2017). The use of situated cognition for physician training is an effective method for developing active and thriving communities of practice (Durning, Artino, Pangero,

Vleuten, & Schuwirth, 2010). It has also been shown as an appreciated model for a learning experience in students completing one year of medical school (Burgess, Oates, Goulston, & Mellis, 2014).

The way a healthcare professional communicates differs based on their discipline. Participating in clinical education allows radiology students the opportunity to see how technologists communicate within the culture of radiology. They are able to experience the different communication techniques used based on the activity. Through the context of situated cognition, "Learning is not viewed as the acquisition of knowledge contents, but in terms of expanding the learner's action possibilities in larger systems of activity" (Roth & Jornet, 2013, p.467). The context of radiology communication is different from traditional healthcare models and the student must expand their current communication knowledge into the culture of radiology. Contextual differences emerge from these various activities.

The progression of student learning from observation to participation is found in the situated cognitive concept of legitimate peripheral participation and is present in a properly constructed clinical curriculum. Mere clinical placement alone does not promote learning (Holmstrom & Ahonen, 2016). It must be done with experts willing to demonstrate proper practices which allows the students to progress from peripheral to expert. Students unable to progress beyond the periphery feel uncomfortable, unwanted, and lack motivation (Misfud, Castillo, & Portelli, 2015).

The development of soft skills relies heavily on the experts with which the students are working. Clinical tutors are viewed as ones who model empathy, respect, compassion, and good communication skills (Burgess et al, 2014). Healthcare students have identified the best teachers as those who could exhibit characteristics in their clinical practice that were genuine,

enthusiastic, and deemed their non-cognitive abilities as important as their cognitive (Goldie, Dowie, Goldie, Cotton, & Morrison, 2015). Modeling, a core component of situated cognition, has been shown to impact the transition from the classroom to clinics (Brown, 2010). Senior physicians who demonstrate proper modeling skills have been shown to have a positive influence on students' clinical communication skills (Brown, 2010). The modeling influence on communication and other soft skills is large and one in which many schools erroneously presume their clinical supervisors are naturally effective (Rosenbaum, 2017).

The use of cognitive apprenticeship has been shown to be an appropriate learning method for healthcare fields including osteopathic medicine (Vaughan, MacFarlane, & Florentine, 2013). The positive effects on soft skills include the development of communication competence and those attributes of a healthcare professional (Vaughan et al., 2013). The scaffolding and articulation components found in cognitive apprenticeship have shown to foster a higher level of responsibility which yields a more competent critical thinker and independent physician (Steinert et al., 2017). The progression of a student from peripheral to expert has shown to successfully manifest itself if given enough time. Specifically, the concepts of scaffolding, reflection, and exploration are seen in those clinical programs with longer clinical rotations (Stalmeijer, Dolmans, Wolfhagen, & Scherpbier 2009).

**Significance of Study**

When compared to other healthcare disciplines, little research has been conducted on the radiologic technologist, despite their importance. There has been no research conducted on the attitude radiology students have toward learning communication skills. This study will add to the body of research already conducted on the attitude toward learning communication skills conducted in other disciplines. Understanding the attitude an RT student has will show how

much they value learning communication skills. Knowing the influence clinical education has on communication development, a student's attitude may indicate the value the culture of radiology puts on communication skills. Additionally, assessing students' attitudes based on their progression in a program can better equip the educational programs to decide if or when additional communication training is needed. Finally, by determining if there are disconnects seen in the classroom and clinics, further research can be done to establish a communication model that applies to radiology. Due to the lack of literature available on the student radiologic technologist communication learning habits, this study will provide a foundation on which to improve the educational curriculum and profession.

**Definition of Terms**

*American Registry of Radiologic Technologists (ARRT)* – Professional organization that certifies and registers qualified radiologic technologists (Gurley & Callaway, 2011).

*Clinical Education* – The operational definition of clinical education for this study is the portion of a radiology program where students work in a healthcare facility supervised by a radiologic technologist and performing the duties of a technologist.

*Clinical Instructor* – The operational definition of a clinical instructor for this study is a radiologic technologist who supervises and instructs students in clinics.

*Clinics* – Synonymous with clinical education.

*Cognitive Apprenticeship* – A process where which students can learn complex concepts by observing, interacting, and practicing with the teacher and other students (Collins, Brown, & Newman, 1988).

*Communication Skills* - The operational definition of a communication skills for this study is having a patient-centered emphasis to enhance the quality of the relationship between the technologist and patient.

*Computed Tomography (CT)* – Radiographic cross-sectional electronically created image (Gurley & Callaway, 2011).

*Cross-sectional Research Design* – The collection of data from a sample at one specific point in time (Jupp, 2006).

*Legitimate Peripheral Participation* – A concept whereby the learner participates in authentic contexts where knowledge is obtained in a progressive manner (Lave & Wenger, 1991).

*Magnetic Resonance Imaging (MRI)* – A modality that uses magnetic fields and radio frequencies to produce images (Gurley & Callaway, 2011).

*Patient-centered communication* - The array of communication behaviors that can enhance the quality of the relationship between the health care provider and patient (Wanzer, Booth-Butterfied, & Gruber 2004).

*Radiography* – Produces images of internal structures using ionizing radiation (LaFleur-Brooks & Brooks, 2018).

*Radiologist* – A physician who specializes in the diagnosis and treatment of disease using medical imaging (LaFleur-Brooks & Brooks, 2018).

*Radiology* – The branch of medicine dealing with the use of x-rays, radioactive substances, and other forms of radiant energy in diagnosis and treatment of disease (Miller, 2005).

*Radiologic Technologist (RT)* – Healthcare professional skilled in the theory and practice of the technical aspects of radiation in the diagnosis and treatment of disease (Gurley & Callaway, 2011).

*Situated Cognition* – A theory that suggests knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used (Brown et al., 1989).

*Sonography* – A modality that uses high frequency sound waves to produce an image (Gurley & Callaway, 2011).

*Technologist* – Synonymous with a radiologic technologist.

**Delimitations and Limitations**

This study is delimitated to students who are working toward enrollment or who are currently enrolled in a JRCERT accredited radiography program. The schools solicited offer a certificate of completion, associate degree, and baccalaureate degrees which are geographically dispersed in the United States. To determine the influence clinical education has, this cross-sectional design solicited students in varying stages of their education to include those who have not yet been admitted, those who are admitted and have not started clinical training, those who have up to 500 hours of clinical experience, and those who have more than 500 hours of clinical training. Access to students was obtained through the program directors or instructors of the solicited educational programs.

The cross-sectional design of the study is a limiting factor as this represents a group of students at one point in their education and does not factor the educational growth that could be seen in a longitudinal design. The convenience sampling used in this study is another limiting factor. The students' attitudes from the selected institutions may not represent the attitudes of other schools both in and outside the United States. The non-probability sampling method used in this study precludes the generalization of its findings to the larger population of radiology students.

## Summary

There is a greater emphasis in healthcare to improve the patient's experience. The effectiveness of a healthcare worker's communication has a large influence on the overall experience. A shift from a disease-centered communication approach to one focused on the patient has forced healthcare educational programs to reevaluate the emphasis that is placed on communication development. With studies showing the communication skills of recent graduates lower than what employers are expecting, there is a need for more research to fill this gap. Healthcare communication research is largely based on physicians and nurses. Disciplines within radiology have been largely underrepresented. In order to increase the communication skills of the larger field of healthcare, research needs to expand and recognize the different needs of each discipline.

There is a known gap between the formal theoretical concepts of communication taught in the classroom and the informal application found in clinics. The theory of situated cognition recognizes the importance of learning in an authentic environment such as those found in clinical education. The willingness to learn communication skills is largely based on the students' attitude. Previous studies have shown a decrease in a certain healthcare students' attitudes toward learning communication skills the longer they are in clinics. To date, there are no studies that evaluate the attitudes radiologic technologist students have on learning communication skills. This study is designed to add to the current body of research on communication skills development by including radiology.

## CHAPTER 2: Review of Related Literature

Communication is a skill valued by healthcare regulating organizations. Several organizations such as the Association of American Medical Colleges, Accreditation Council for Graduate Medical Education, American Board of Medical Specialties, and The Institute of Medicine have all included communication as part of their policies (Duffy, Gordon, Whelan, Kelly, & Frankel, 2004). The Joint Commission, which accredits nearly 22,000 healthcare organizations has as part of its standards, "The hospital effectively communicates with patients when providing care, treatment, and services" (Joint Commission, 2010, p.59). In radiology, the Joint Review Committee on the Education of Radiologic Technology (JRCERT) requires the assessment of communication as part of their accreditation standards.

The benefits of effective communication include a lower risk of litigation and better outcomes (Benson, 2014; Levinson, Roter, Mullooly, Dull, & Frankel, 1997). In the clinical setting, radiology students are provided the opportunity to practice their skills working with and being supervised by other technologists. This section will provide a review of the literature in healthcare communication within the various disciplines of radiology. There is minimal literature available on the specific communication habit, development, or style of the radiologic technologist. Therefore, much of the literature is based on research conducted on disciplines outside of radiology. The widely accepted concept of patient-centered communication is explained along with the main components for effective communication: empathy and listening. The communication style of RTs will be described as will effective methods for development which include the importance of clinical education and elements found in the theory of situated cognition. Finally, the importance of self-efficacy and attitude will be explained.

**Patient-Centered Communication**

Patient-centered communication (PCC) is a common model used in healthcare that has been widely reported for decades to improve health outcomes and the satisfaction of patients (Stewart, 1995). PCC has been defined in many ways depending on the context and is primarily focused on physicians (Street, 2013). A broad definition of PCC was given by Wanzer, Booth-Butterfied, and Gruber (2004), "Patient-centered communication is the array of communication behaviors that can enhance the quality of the relationship between the healthcare provider and patient" (p.364). More specifically, the PCC model involves three goals: eliciting the patient's perspective on the illness, understanding the patient's psychosocial context, and reaching shared decision goals (Hashim, 2017). Much of this model improves physician communication related to the treatment a patient receives and the delivery of a poor diagnosis, such as cancer (Tulsky et al., 2017). While the concept of a patient-centered model is well established, the efficacy in relation to health outcomes has been challenged (Street, 2013; Salmon & Young, 2017). Determining if patient-centered communication affects health outcomes depends on what outcomes are being measured, when they are measured, what elements of communication are being measured, and how the elements are measured (Street, 2013). Despite these challenges, the patient-centered communication model is, in general, an accepted way to better the patient's experience.

In radiology, a patient-centered approach is different since it is out of the scope of practice for an RT to diagnose. In addition, the radiologist, who is the doctor that makes a diagnosis, has been characterized as a “doctor to doctor” consultant and is distanced from patients (Itri, 2015). This mentality is not based on lack of compassion but on research that suggests patients prefer to receive results from their referring physician (Carbarrus, Naeger,

Rybkin, & Qayyum, 2015; Mangano et al., 2014). A radiology specific patient-centered experience is more holistic and derives from the scheduling process, the imaging exam itself, reporting, billing, and future communications (Kemp et al., 2017). The RT is central to the patient's radiology experience and many of their responsibilities depend on effectively communicating with the patient (Itri, 2015). While the responsibilities of patient-centeredness may differ in radiology, having an RT with effective interpersonal communication skills are still important (Salazar et al., 2013). Two of the primary non-verbal components of effective communication that lead to a more satisfied patient are empathy and listening (Salazar et al., 2013; Wanzer, et al., 2004).

**Empathy**

Empathy in the context of medical education and patient care is defined by Hojat et al., (2009) as, "The cognitive attribute that involves an understanding of patients' experiences, concerns, and perspectives combined with the capacity to communicate this understanding" (p.1138). Empathy can be conveyed through non-verbal communication actions. Being an empathetic communicator has shown to increase professional competence (Ogle, Busnell, & Caputi, 2013). Professional competence is best defined by Epstein and Hundert (2002) as, "The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served" (p.226). Empathy is a key component of interpersonal communication and involves connecting to a person and having emotional resonance. A distinction should be made between empathy and sympathy regarding its influence on the patient experience. Sympathy is an unwanted pity-based response (Sinclair et al., 2017).

Conveying empathy through non-verbal communication such as eye contact, posture, and facial expression will not only convey warmth, but also a higher level of competence in a physician's ability (Kraft-Todd et al., 2017). In the study by Kraft-Todd et al. (2017), participants viewed photographs of physicians displaying non-verbal behaviors linked to empathy such as eye contact, equal patient-physician eye-level, no physical barrier, open posture, touch, and concerned facial expression as well as photographs of those who were not. The results showed that participants rated the physicians displaying empathetic nonverbal behavior as warmer and more competent (Kraft-Todd et al., 2017). These results are consistent with previous research indicating empathetic communication skills are one of the best ways to improve patient satisfaction and patient compliance (Kim, Kaplowitz, & Johnston, 2004). It should be noted, many of these non-verbal cues, such as open posture, are universally accepted as positive. However, being culturally aware is important since there is also evidence that some nonverbal cues, such as eye contact, may have a different meaning based on the patient's culture (Lorie, Reinero, Phillips, Zhang, & Riess, 2017). Ignoring cultural differences may inadvertently be offensive, thereby, decreasing the patient's satisfaction of their healthcare experience.

While empathetic communication is commonly taught in healthcare coursework, there is evidence showing a decline of empathy the longer a medical student progresses in their clinical training (Chen, Kirshenbaum, Yan, Kirshenbaum, & Aseltine, 2012). The sharpest declines appear during the third year of four-year matriculation (Hojat et al., 2009). However, it should be noted, the methods used to show these precipitous declines have been challenged and deemed exaggerated (Colliver, Conlee, Verhulst, & Dorsey, 2010). Despite the discrepancies, the reasons cited for the empathetic decline are important. These reasons include: a lack of positive role models, a high volume of materials to learn, time pressure, and patient and environmental factors

(Hojat et al., 2009). Other sources indicate that the reasons for a decline of empathy once medical students start clinical education include mistreatment and vulnerability of medical students (Neumann et al., 2011).

More technology-orientated professions, such as radiology, showed lower empathy than patient-centered disciplines such as nursing and midwifery (Hojat et al., 2009; Williams et al., 2015). These findings further emphasize the difference between radiology and other disciplines. The extent to which empathy has on effective radiology communication has not been determined. It has been shown that patients' perceptions of care in radiography rarely include the term compassion as this can be shown in other ways (Bleiker, Knapp, Hopkins, & Johnston, 2016). Therefore, while empathy is important, it may manifest itself differently in radiology than other healthcare disciplines.

With newer regulations tying insurance reimbursement to patient satisfaction and positive outcomes associated with patient-clinician relationships, these findings indicate empathetic nonverbal behaviors are important. This increased emphasis on empathy is well known and more healthcare programs are assessing this skill. However, a student's observable empathetic behavior and their self-reported feelings have shown to be different (Ogle et al., 2013). It is hypothesized that a student may act a certain way because it's the expected response, but not genuinely feel it. This is a result of the student's underlying attitudes and dispositions toward empathy (Ogle et al., 2013). The barriers previously mentioned factor into the student's attitude and self-efficacy toward empathetic communication. Students who lack self-efficacy due to barriers such as time constraints or poor role-modeling show a decrease in their patient-centeredness and empathetic communication (Bombeke et al., 2010). Listening is another non-verbal interpersonal skill that has shown to improve the patient experience.

**Listening**

Attentive listening has shown to have positive effects on patient outcomes. According to Bodie, Janusik, and Valikoski (2008), listening is defined as, "The attending, receiving, interpreting, and responding to messages presented aurally" (p.7). A healthcare worker's ability to listen to the patient has been shown to increase compliance with instructions and patient satisfaction (Davis, Foley, Crigger, & Brannigan, 2008). In a qualitative study, researchers described the importance of physician listening based on the perspective of patients (Jagosh, Boudreau, Steinert, MacDonald, & Ingram, 2011). By using semi-structured interviews to gather information on the qualities that make a good doctor, listening became a predominant theme. Follow-up questions resulted in 3 themes important to patients involving listening. Listening enables physicians to make accurate diagnoses, is instrumental in creating and maintaining a good doctor-patient relationship, and acts as a healing and therapeutic agent (Jagosh et al, 2011). The practical benefits of listening include reducing stress, increasing joint decision making, instilling patient confidence, ensuring patient compliance with treatments, and contributing to a richer interpersonal dialogue (Jagosh et al., 2011).

The effect of listening on joint-decision making was studied on patients with chronic illness (del Río-Lanza, Suárez-Álvarez, Suárez-Vázquez, & Vázquez-Casielles, 2016). To improve the relationship between patient and healthcare professionals, the concept of shared decision making (SDM) is becoming a popular method and element found in the patient-centered model. In SDM, both the patient and doctor actively participate in finding and sharing information related to treatment to reduce the asymmetry of information and power from doctor to patient (del Rio-Lanza et al., 2016). The quantitative study of 181 patients with the chronic illness hemophilia showed that attentive listening from the physician to the patient affected

patient perspective to shared decision-making regarding the patient's self-efficacy and proactivity (del Rio-Lanza et al., 2016). As a result, if a healthcare professional creates an environment where the patient can discuss their concerns without interruptions, feel comfortable sharing information, and not undervalue their personal knowledge and expertise, the patient's confidence and compliance with treatment increases.

In radiology, patients have indicated the top key attribute that drives their experience was listening to them and acknowledging their concerns (Steele, Jones, Clarke, & Shoemaker, 2015). Some of the concerns relate to wait time for the exam and others relate to the exam itself. Depending on the exam, the patient may be in pain, uncomfortable, or both. Attentive listening for the RT, while not related to developing a plan to treat a problem, regards the pain patients are experiencing who may not be able to tolerate more time in the scanner or more barium in the colon (Ellenbogen, 2012). Training in active listening and communication skills can help an RT develop rapport, tension diffusion, and management of pain, all of which improve the patient experience (Abujudeh, Danielson, & Bruno, 2016). The focus of an RT's communication is different from a physician or nurse. The patient's communication expectations from RTs are also different from what they'd expect from their physician. An explanation of the habits and expectations of an RT's communication is important in determining what type of value is placed on learning communication skills.

**Communication of Radiology Technologists**

The RT is directly involved with patient care but perceives their role differently than other healthcare disciplines. The RT perceives their role as more procedural when giving information (Hadley & Watson, 2016). The type of information given includes self-introduction, type of scan, what to expect during the exam, aftercare, how to obtain results, reassurance, and

compliance (Hadley & Watson, 2016). Patients do not fully understand the differences related to technology in radiology and base their interactions with non-physicians, such as technologists, in determining excellent care (Rosenkrantz & Pysarenko, 2016). A 10-year retrospective analysis of patient complaints of radiology to the Office of Patient Advocacy (OPA) has shown that the majority of complaints relate to the lack of patient-centered care and the interpersonal skills of radiology staff members (Salazar et al., 2013).

In determining what a radiology patient deems as excellent care largely relates to their wait time. The longer the patient has to wait for their exam the higher their anxiety, frustration, and dissatisfaction (Rosenkrantz & Pysarenko, 2016; Salazar et al., 2013). Wait times can increase as the volume of imaging exams for the center or hospital increases. The current fee for service payment model provides incentives to physicians to increase radiology examinations (Kasraie, Jordan, Keup, & Westra, 2018). As a result, radiology has been referred to as a "hit and run" career due to the short amount of time technologists spend with their patients (Reeves & Decker, 2012). This minimal time spent with the patients has shown that RTs can distance themselves from patient emotions. The result is more of a focus on the image than the patient (Reeves & Decker, 2012). The pressures associated with the job of a radiographer encourages an 'out the door' attitude and decreases the patient-centered care mentality (Hayre, Blackman, and Eyden, 2016). The emphasis on the speed of the exam is associated with the technologist's perception that wait times are prioritized over the person and maximum efficiency is the primary focus (Hayre et al., 2016). However, the accepted patient-centered model posits the patient should be given sufficient information from their healthcare provider to make an informed decision which includes the risks. This provides a dichotomy for the technologist because deciding how much information the technologist should give about the risks of the exam has

shown to be minimal since patients prefer to receive that information from their personal physician (Thornton et al., 2015).

The balance between providing a quality image promptly while still providing an excellent patient experience is one that is unique from other healthcare disciplines. The identity of radiology is predicated on the actions of the technologist. The focus on speed and quality of the image has resulted in developing communication styles of being autocratic, bossy, forceful, and other controlling rather than compassionate traits (Booth & Manning, 2006). Whether this is the accepted normal standard practice has been challenged. Advanced communication and interpersonal skills training in a busy MRI center have shown to decrease the time it took to complete the exam and increase patient satisfaction (Ajam, Nguyen, Kelly, Ladapo, & Lang, 2017).

The responsibilities of the RT differ from other healthcare professions. However, the need to possess effective communication skills is still necessary to better the patient's experience while having a radiological study. Unlike nursing and other healthcare professions, there have been few attempts to develop theories or communication models for radiography. Those that have been developed were not applicable to the field (Reeves & Decker, 2012).

**Communication Development**

Transferring the didactic theory learned in the classroom to clinics is a crucial step in the development of healthcare students. Communication theory for most healthcare programs is taught in the pre-clinical years (Suojanen et al., 2018). However, to properly develop interpersonal skills, the traditional lecture and reading style of learning is the least effective (Gunderman & Brown, 2012). Lectures and reading are a more passive learning style that requires the learner to absorb information. Learning by doing is a more productive method. The

challenge for healthcare educators is how to allow students to practice without putting a patient's care in jeopardy. Various teaching methods have been used which include debates, case studies, role-playing, storytelling, journaling, simulations, theater in education, and problem-based learning. While each method has its benefits, role-playing and simulations are the more common methods (Nestel & Tierney, 2007).

Role-playing is commonly used in healthcare programs and has shown to be an effective means of learning communication skills (Koponen, Pyorala, & Isotalus, 2014). The use of role-playing allows the focus to be on the learner. While this focus may cause anxiety to some students, it is a good method to assess interpersonal skills. An additional benefit happens when the student acts as both the healthcare provider and patient, known as role-reversal, which helps to teach empathy toward the patient (Baile & Blatner, 2014). However, the reliance on students for an enriching experience may pose problems for role-playing. Criticisms include over-acting, lack of clarity/realism, and uncertainty of the quality of feedback (Nestel & Tierney, 2007). With the advancements in technology, simulations may provide another avenue.

Simulations can be done using a variety of methods including devices such as mannequins, trained persons acting as patients, virtual reality, or other contrived situations that mimic situations seen in the real world. Simulations are not a new concept and have been traced to early eighteenth century France (McGaghie, Issenberg, & Barsuk, 2014). Simulations can place the student in emergency type situations where instructors can assess their response and coach them in a controlled environment without risking the care of a real patient. For example, in the Program to Enhance Relational and Communication Skills (PERCS), actors are used to play patients and family members.

This program was shown to be effective in developing communication and interpersonal skills in radiologists (Gunderman & Brown, 2012). Using actors has also shown an additional benefit in improving the self-confidence of radiologists in communicating with patients (DeBenedectis, Gauguet Makris, Brown, & Rosen, 2016). Virtual reality simulators have also shown promise in improving communication skills knowledge and confidence (Quail, Brundage, Spitalnick, Allen, & Beilby, 2016). The newer virtual reality simulators can be combined with mannequins to provide multiple scenarios the student must navigate, all while the mannequin's vital signs and critical levels fluctuate.

While these results appear promising, the use of technology alone cannot replace the value of human connectedness, context, and culture the essence of situated cognition. These can be found best in a clinical site working with patients, such as a hospital. It is then suggested, for interpersonal skills development, that a combination of mentored clinical practice along with technology is a better option (Bhana, 2014). Mentored clinical practice is the core of situated cognition. Within the theory of situated cognition, the concepts of legitimate peripheral participation and cognitive apprenticeships provide a proper framework for cognitive development.

**Legitimate Peripheral Participation**

Skills needed for clinical competence requires hands-on practice in authentic clinical environments (Onda, 2012). Situated cognition places equal emphasis on the person and environment. Through the lens of situation cognition, knowledge is conceptualized by being located in the actions of individuals and will evolve with new situations (Artino, 2013). To accomplish this, learning in the situated activity has a central characteristic that Lave and Wenger (1991) termed, legitimate peripheral participation (LPP). Legitimate peripheral

participation involves a concept whereby the learner participates in authentic contexts where knowledge is obtained in a progressive manner. Initially, learning begins on the periphery and moves toward full participation.

The concept of being a peripheral participant allows the learner to first view the culture and see what there is to learn. As the learning curriculum unfolds, there will be more opportunities for engagement which provides the learners the opportunity to become part of the culture (Lave & Wenger, 1991). The application of LPP is found in apprenticeships. However, the dynamic between student and master takes on a different role than the traditional authoritarian model. The master-apprentice role defined by Lave and Wenger (1991) is that which "leads to an understanding that mastery resides not in the master but in the organization of the community of practice of which the master is part" (p.94). If given the opportunity through extended periods of time as an apprentice, the student can make the culture of practice their own. Through a well-structured curriculum, a student is offered the opportunity to excel through LPP. A crucial component for a radiologic technologist student is clinical education. Cognitive apprenticeship provides the appropriate model to incorporate LPP within the situated cognition theory.

**Cognitive Apprenticeship**

The practical application of situated cognition can be completed through the cognitive apprenticeship model. This learning method allows the opportunity for learners to acquire skills by working with practitioners in a given field, with the goal being the learner develops their own cognitive skills. The use of cognitive apprenticeship can be used in many areas of health science education such as simulation and online learning but is most often used in the clinical environment (Lyons, McLaughlin, Khanova, & Roth, 2017).

Cognitive apprenticeship differs from the traditional apprenticeship model in two ways. First, traditional apprenticeships assign tasks not from an academic framework, but the demands of a workplace. Cognitive apprenticeship assigns tasks to illustrate the purpose of their activities. Second, traditional apprenticeships emphasize teaching skills in the context of their specific purpose whereas cognitive apprenticeships generalize knowledge so it can be used in different settings (Collins & Kapur, 2014). One of the problems associated with traditional apprenticeships is that the job dictates the tasks a student will do (Collins, Brown, & Holum, 1991). This narrow view of a task inhibits the student from adapting to a changing environment. The intent of cognitive apprenticeship is to develop a better understanding of the methods that influence an action rather than the action itself. This knowledge can then be used as a foundation for other tasks when situations or environments change. Cognitive apprenticeship can be used in any aspect of an educational environment that influences what and how students learn (Lyons et al., 2017). The intent is to develop a better understanding of the methods that influence an action rather than the action itself.

**Framework of Cognitive Apprenticeship**

The framework of cognitive apprenticeship operationalizes four interconnected dimensions applicable to any learning environment: content, methods, sequencing, and sociology (Collins et al., 1991) (Figure 2). Each dimension has domains associated with them that help carry out their intent. Content refers to the type of knowledge to which students are exposed. In cognitive apprenticeship, content should include strategic knowledge which is able to solve real-world problems that are required for expertise (Collins & Kapur, 2014).

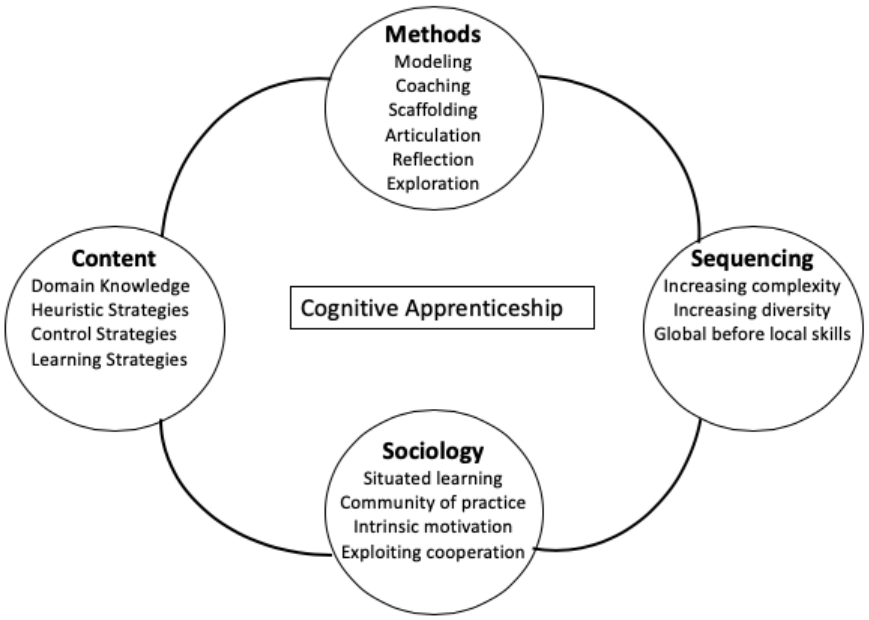


*Figure 2.* Framework of cognitive apprenticeship

The four content domains include: domain knowledge, heuristic strategies, control strategies, and learning strategies (Collins et al., 1991). Domain knowledge includes the conceptual information needed for a subject. This knowledge can be found in the didactic setting such as lectures and textbooks. While cognitive apprenticeship involves a more active role, the need for foundational information is recognized. Heuristic strategies relate to, as Collins and Kapur (2014) define it, "tricks of the trade" (p. 111). These strategies are meant to develop problem-solving skills based on the experience had by the experts. Control strategies refer to the process of choosing and accomplishing a task for a given problem. This is largely based on the knowledge the student has gained from the domain and heuristic steps. Finally, learning strategies include the ability to acquire new knowledge on different concepts or tasks. Learning strategies are built upon the previous domains but allow the student to use the knowledge already obtained in other areas to expand their knowledge.

Implementing effective teaching strategies enables the student to acquire cognitive abilities for using, managing, and discovering knowledge (Collins et al., 1991). To accomplish this, cognitive apprenticeship uses teaching methods that enable the student to connect their factual and conceptual knowledge. There are six methods which include: modeling, coaching, scaffolding, articulation, reflection, and exploration (Collins et al.,1991). Modeling refers to the expert performing and explaining a task while the student observes. Through modeling, the student can build a conceptual model from the experts on the activities, culture, and context, which are the basis for the situated cognition theory. Coaching involves the expert observing the student and offering immediate feedback and advice. Through coaching, an expert can reinforce previously acquired knowledge and inform the student of unknown knowledge whilst the student is performing an activity. Scaffolding includes offering the learner support more specific than that seen in coaching. When scaffolding, experts will assess the student's current level of expertise and provide autonomy in the areas the student is competent and guidance in the areas the student is not. Articulation includes any method that allows the student to explain their knowledge. This could include questioning the student or having the student critique others on the same activity. Through articulation, the student expresses and refines their understanding (Collins & Kapur, 2014). Reflection involves the student analyzing their problem-solving abilities in relation to the expert and allows them to self-assess their status. Finally, exploration is aimed at guiding the student to become independent through goal setting. At this stage, the expert should take a more passive role, forcing the student to prove their abilities independently (Collins & Kapur, 2014).

Cognitive apprenticeship recognizes the importance of implementing learning activities in a sequence appropriate for developmental learning. Sequencing involves 3 areas: increasing

complexity, increasing diversity, and global before local skills (Collins et al., 1991). Increasing complexity involves controlling learning activities where simpler tasks are mastered before more complex tasks are introduced. In healthcare, for example, learning the components of a wheelchair and moving it without a patient should be done before being expected to transport a real patient. Scaffolding would be used as a method to increase complexity. Increasing diversity involves a gradual increase in exposure to other activities that require more complex skills. In this step, students apply their learned skills over more diverse problems. Global before local skills allow students develop a conceptual model of the skill to be carried out before applying it to individual tasks (Collins et al., 1991).

The final domain in the framework of cognitive apprenticeship is sociology (Collins et al., 1991). Sociology, in the context of cognitive apprenticeship, places the student in the environment of the experts so they may become experts themselves. The sociology domain includes four areas: situated learning, community of practice, intrinsic motivation, and exploiting cooperation (Collins et al., 1991). Situated learning involves the student performing tasks and solving problems in the environment their knowledge would be used. Communities of practice refer to the learning environment which includes individuals actively communicating and engaging in the activities the student is expected to master (Lave & Wenger, 1991). Intrinsic motivation is the personal goals set by the student to seek skills and solutions. Finally, exploiting cooperation involves students working together to solve problems and perform activities. By doing so, students extend learning resources and enhance their knowledge (Collins & Kapur, 2014). An effective apprenticeship program will be able to guide the curriculum, so students learn the skills the industry needs based on its culture (Shaw, Gordon, Xing, & Carroll, 2019).

The elements of cognitive apprenticeship are found in clinical education. A problem with this is the lack of training in the educational domains which are commonly found in many healthcare programs for those who will supervise the students (Lyons et al., 2017). The reliance on the clinical environment to provide real-world learning is vital to any healthcare program including those in radiology. It is important for those who will work with students to realize their interactions, opinions, and attitudes will affect the student (Mileder, Schmidt, & Dimai, 2014). In regard to communication, it was shown that medical students want the cognitive apprenticeship elements of feedback and coaching more than it was given (Schopper, Rosembaum, & Axelson, 2016). When coaching and feedback were given, the emphasis was more on content than communication skills (Schopper et al., 2016). The importance of clinical education on the development of communication skills have been studied and have shown to both positively and negatively impact the student.

**Clinical Education**

Medical students have reported that one of the main ways they learn communication skills is through observing role models and how they interact with patients (Rosembaum & Axelson, 2013). Without the reinforcement of these theoretical concepts in the clinics, there has shown to be a decrease in physicians' communication skills (Bombeke et al., 2010). This can be the result of a disconnect between the formal teachings and the informal which takes place during the students' everyday practice in clinical education known as the hidden curriculum (Silverman, 2009). The impact of this can be large since the greatest influence on student learning is from those they work with in clinics (Brown, 2010). While the hidden curriculum may influence many skills, for communication, it may contradict the pre-clinical or formal sessions (Rosembaum, 2017). It has been shown, with regard to communication skills among

medical students, that what was taught pre-clinically was only somewhat or not modeled at all by their teachers in clinics (Rosembaum & Axelson, 2013).

Knowing students learn communication skills through observing their role models and how they interact with patients is consistent across disciplines including radiography (Conway, Lewis, & Robinson, 2008). A role model is one who has a wide range of ideal attributes (Conway et al., 2008). Role modeling influences many aspects of students' learning including patient-centered skills, knowledge, and attitude (Bombeke et al., 2010). Positive role models demonstrate how to behave with patients, develop students' professional roles in practice, and integrity (Passi & Johnson, 2016) while poor role modeling can cause inappropriate or unethical behavior (Mileder et al., 2014). During medical training, 90% of students will identify one or more persons as a role model (Wright, Wong, & Newill, 1997). The majority of role models were selected from the clinical setting and not from the academic setting (Conway et al., 2008). While the influence of a role model is great, students must be willing to learn. It has been implied that students' attitudes can impact the effort a role model puts forth (King, 2017). A good clinical student will be enthusiastic, motivated, and participate in learning (Goldie et al., 2015). As a result, many people can positively or negatively influence the student. Those identified as role models in radiography do not necessarily have the highest degree of technical competence, rather they demonstrate higher-order patient communication and care skills (Conway et al., 2008).

Integrating formal communication skills training during the clinical years has been proposed as an obvious explanation to bridge the gap between the classroom and clinics (Rosenbaum, 2017). In the study on students at the Columbia University of Physicians and Surgeons, an intervention communication curriculum was delivered and compared to a control

which showed the intervention group improved their communication skills (Soujanen et al., 2018). Students have responded positively to integrating communication training during clinical years (van Weel-Baumgarten, Bolhuis, Rosembaum, & Silverman, 2013). While there is evidence of the positive effects of integrating communication education through clinics, it is not unanimously accepted. In the study by Bombeke et al., (2011), the cohort receiving an integrated communication curriculum showed a decrease in their patient-centered attitudes and their attitudes toward communication skills training while the control remained stable. One possible explanation for this was, "The untrained student has nothing to compare with, we will always test against what we've learned" (Bombeke et al., 2011, p.317). Students compare the aspects taught in a formal training course to those by which they are supervised in the clinical setting. The actions of clinical instructors influence the students on the communication styles and value placed on communication development. The better equipped a student feels to effectively communicate with a patient relates to their self-efficacy.

**Self-Efficacy**

Self-efficacy refers to the judgment of how one can complete a given task (Bandura, 1982). While originally used as behavioral modifications to treat phobias, self-efficacy has been used in many other areas including healthcare education (Williams, Beovich, Ross, Wright, & Ilic, 2017). Self-efficacy has shown to influence behavior because individuals form intentions based on how confident they can perform an action (Armitage & Conner, 2001). The action in this study is communication and the ability to complete this outcome expectancy is predicated on their efficacy expectation.

Efficacy expectation is the confidence one has to successfully execute the behavior required to accomplish an outcome (Bandura, 1977). This is different from outcome expectancy,

which is one's estimate that a given behavior, influenced by self-efficacy, will lead to an accomplished outcome (Bandura, 1977). If a person knows what the correct activities are to complete a given task, yet lacks the confidence that they can competently perform the necessary activities, the information will not reflect in their behavior (Bandura, 1977). Efficacy expectation determines how much effort one will put forth in a given task and the length of time they will persist in completing the task when faced with obstacles (Bandura, 1977). This factors into motivation, where people will give up trying to accomplish a given task if they seriously doubt they can meet the expected level of performance (Bandura, 1978). Those that have higher self-efficacy have a higher expectation that they will properly execute the behaviors needed to accomplish a given task. There are four factors that influence one's self-efficacy: performance accomplishments, vicarious experience, verbal persuasion, and physiological states.

The four influences of self-efficacy can be found in clinical education. Performance accomplishments are, according to Bandura (1977), "Especially influential because it is based on personal mastery experiences" (p.195). The more someone has had previous victories in an activity, the higher their perceived ability to sustain their accomplishments and the negative impact of occasional failures diminishes (Bandura, 1977). In clinics, this can be seen as the student progresses and builds on prior knowledge and accomplishments. Vicarious experience involves seeing others perform activities successfully which provides assurance that they too can be successful with enough practice. Modeling from the clinical instructors or technologists with which students work will provide vicarious experiences. Verbal persuasion includes encouragement and suggestions from others that they possess the ability to accomplish a task. Those who are persuaded and provided provisional aids are more likely to increase their efforts to accomplish the task (Bandura, 1977). Physiological states of emotional arousals such as

tension or anxiety also factor into one's self-efficacy. Anxiety can not only affect self-efficacy but attitude as well. There has shown to be a negative correlation between a student's anxiety and their attitude toward learning communication skills (Loureiro, Severo, Bettencourt, & Ferriera, 2011).

Clinicians often report a lack of self-confidence when communicating with patients (Norgaard, Ammentorp, Kyvik, & Kofoed, 2012). Communication skills training has shown to impact self-efficacy. A quantitative study of 181 healthcare professionals working in an orthopedic surgery department was completed to determine the impact communication training had on the participants' self-efficacy. In a multi-discipline study including doctors, nurses, nursing assistants, secretaries, and other staff members, a questionnaire was designed that included eight questions regarding their self-efficacy in communication with patients and eleven questions concerning communication with colleagues. A baseline self-efficacy score was gathered immediately before the training. Additional assessments were conducted immediately after the training as well as six months later. Results showed that participants' self-efficacy increased when compared to the baseline score and immediately after training. Additionally, participants' self-efficacy increased from the baseline and six months after training (Norgaard et al., 2012). For a department specific study, this shows communication training does have a positive impact on self-efficacy. Limitations of the study include the lack of measurement of internal reliability and its self-reported method. The long-term implications have been studied and have shown to have lasting effects (Gulbrandsen, Jensen, Finest, & Hartigan, 2013). In an observational study on a randomized control trial of physicians following communication training three years prior resulted in long-term increases in self-efficacy (Gulbrandsen et al.,

2013). These findings indicate that high self-efficacy in communication yield long-term benefits in areas related to the development of effective communication.

The effect of clinical education has on self-efficacy has yielded positive results. In an experimental study regarding the effects communication training had on a cohorts' communication self-efficacy, those who had the training resulted in a higher self-efficacy (Noble, Kubacki, Martin, & Lloyd, 2007). This result hypothesized that a student's attitude toward a patient-centered approach may be related to their self-efficacy to communicate with them (Noble et al., 2007). Regarding the role clinical education may have, Skoglund et al., (2018) found that student nurses in their final semester of training showed a higher self-efficacy in communication skills than those in their second semester. However, clinical education alone may not be sufficient. There is evidence to show that those who have not received any formal communication training prior to or during clinical training are less skilled in clinical communication behavior, treatment communication, and interpersonal communication ability (Xie, Ding, Wang, & Liu, 2013). Based on these findings, communication training does have an impact on self-efficacy.

**Attitude**

Attitude is, as defined by Eagly and Chaiken, (1993), "A psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p.1). In this definition, psychological tendency refers to a state internal to a person and evaluating refers to the intervening factor between a stimulus and the response (Eagly & Chaiken, 1993). For this study, the stimuli would be learning communication skills. The evaluation process can lead to three different reactions concerning the stimuli called the multi-component model of attitude (see Figure 3): affective, behavior, and cognition (Rosenberg & Hovland, 1960; Brahm & Jenert,

2015). In this context, affective refers to the feelings or emotions one has about the stimuli, behavior encompasses the action, and cognition contains the thoughts people have about the stimuli (Eagly & Chaiken, 1993).

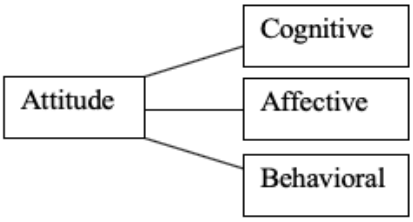


*Figure 3*. The multi-component of attitudes (Brahm & Jenert, 2015)

In a general sense, learning about students' attitudes towards the study environment and the study process will help understand their reaction to educational interventions (Brahm & Jenert, 2015). More specifically, assessing the attitude a student has toward learning communication skills is important because of the influence attitude has on the adoption of communication skills in practice (Wright et al., 2006). It has been well documented that attitude impacts behavior (Ajzen & Fishbein, 1977). There have been various models depicting the relationship attitude has on behavior. A frequently cited theory is from Ajzen and Fishbein (1977), the theory of reasoned actions (TRA). This theory posits attitude and subjective norms are essential in behavior based on their influence on intention. Subjective norms relate to an individual's beliefs about how those who are important to them think they should perform a given behavior (Bentler & Speckart, 1979). The TRA has been studied and modified to include other factors that influence behavior. According to Bentler and Speckart (1979), attitude and previous behavior may have a larger role than originally cited in the TRA. It has been suggested, however, that the TRA is restricted to behaviors that are voluntary (Eagly & Chaiken, 1993).

This way of thinking dismisses the idea that attitudes may elicit behavior with little or no intervening thought, such as liking a product elicits impulse buying or behaviors may occur independently of attitude such as behaviors done out of habit (Eagly & Chaiken, 1993). A commonality is seen in the study that strong attitudes are more likely to affect behavior (Holland, Verplanken, & Knippenberg, 2002). A common method of assessing communication in healthcare is through direct observation between the student and the patient. A limitation to this method involves the need to standardize the assessment to minimize variability between observers which can be difficult (Baharudin, Yassin, Sham, Yusof, & Ramli, 2017). Understanding the attitude a student has toward learning communication skills is important because of the influence attitude has on the adoption of communication skills in practice (Wright et al., 2006).

Student attitudes have been conducted in a variety of disciplines and regions primarily using the Communication Skills Attitude Scale (CSAS) (Rees, Sheard, & Davies, 2002). The CSAS was developed to explore relationships between medical students' attitudes and their demographic and education-related variables (Rees et al., 2002). The differences in demographic variables rely primarily on gender. Females have shown to have a greater positive attitude toward learning communication skills than males. When comparing first and fourth year medical students in a United States medical school, females had a higher positive attitude toward communication skills training but showed lower confidence in speaking with patients (Wright et al., 2006). Medical students from two Universities in the United Kingdom found females to have a statistically significant relationship with higher positive scores (Rees & Sheard, 2002). In dentistry, a principal component analysis was run on the CSAS and found four components: learning, importance, quality, and success (Laurence, Bertera, Feimster, Hollander, Stroman,

2012). Females were found to have a significant difference in positive attitudes compared to males in factors specific to importance, quality, and success (Laurence et al., 2012). A cross-sectional analysis of three years in a medical school found females had a higher positive attitude score in each year compared to males, yet rated their communication competence lower (Cleland et al., 2005). A national Norwegian study of four medical schools found females to have a higher cognitive and affective attitude than males in learning and using communication skills (Anvik et al, 2008). Female students in their third year of medical school in a Portugal University showed higher positive attitudes toward the teaching and learning process but were negatively correlated to their anxiety levels (Loureiro et al., 2011). Findings of females having a higher positive attitude toward learning communication skills compared to males were also consistent in 11 pharmacy students in Norway (Svensberg, Pharm, Brandlistuen, Bjornsdottir, & Sporrong, 2018); surgical residents in China (Zhang, Jiang, Sun, Zhao, & Yu, 2018); and medical students in Germany (Busch, Rockenbauch, Schmutzer, & Brahler, 2015).

When considering the status in a medical program in relation to the attitude toward learning communication skills, findings are inconsistent. Comparing medical students' attitudes in a cross-section of a United Kingdom medical school over three years found first-year students to be more positive toward communication skills learning than those in their second or third year (Cleland et al., 2005). However, there was a lower negative attitude seen in the third year compared to the second which was after the students had more exposure to clinical practice. This may indicate increasing clinical experience leads to a change in attitude as they can see the practicality of proper communication (Cleland et al., 2005). Analyzing differences among a national cross-section of four Norwegian medical schools over six years found variations existed with isolated schools but not as a general rule (Anvik, et al., 2008). It is suggested the differences

are due to each individual school's teaching techniques. A medical school in the United States compared the attitudes toward communication skills training of first- and fourth-year students found that fourth-year students had a significantly higher positive attitude than first-year students (Wright et al., 2006). Medical students in Germany showed first-year medical students had a higher positive attitude compared to those in their fourth year (Busch et al., 2015). Dietetic students in their fourth year of schooling have also shown to have a decline in positive attitudes toward learning communication skills when compared to first year students (Power & Lennie, 2012).

**Summary**

Using a patient-centered communication model is commonly accepted in today's healthcare. As healthcare is becoming more concerned about the patient's experience, a larger emphasis is being placed on the communication habits of its professionals. Elements of effective communication include the non-verbal aspects found in empathy and listening. A central learning component of any healthcare program is its clinical education. Placing the student in an authentic learning environment allows for the application of concepts taught in the classroom. Those with whom the students work in the clinical environment are found to be role models, especially regarding the communication habits of a profession. The communication habits of these role models can have either a positive or negative effect on the student which is largely predicated on the attitude of both the practitioner and student toward learning communication skills. One such effect is a student's self-efficacy which can impact the effectiveness of their communication.

Theoretical concepts involving attitude indicate that attitude has a large role on intention which controls behavior. Therefore, those who do not see the value in learning communication

skills are at risk of developing communication habits that are ineffective. Studies have shown the positive attitude of some healthcare disciplines decreases the longer they are in clinics. However, these findings are not consistent across all studies. Additionally, males appear to have a worse attitude toward learning communication skills than females. These findings have yielded areas to improve the curricula of some disciplines, such as incorporating formal communication training during the clinical years.

Radiology communication differs from the emphasis found in the common patient-centered model. The RT focuses more on the resulting image than creating a relationship with the patient. This mentality is brought about by the fact that the patient's radiology experience is predicated largely on their wait time to get their examination and the interpersonal skills of the RT. Maintaining a balance for both can be challenging. There is no commonly accepted model for RT communication. While radiology programs incorporate communication theory in their formal didactic teachings, the practicality is still found in clinics. Despite the differences, the RT is still expected to learn effective communication habits. The value they place on learning these skills is predicated on their attitude. Since most communication habits are learned in clinics, knowing the attitude an RT student has toward learning communication skills at various stages of training can help determine the value the profession places on such skills. The attitude a radiology student has toward learning communication skills has not been determined and is the purpose of this study.

# CHAPTER 3: Research Method

This chapter presents the research method used to conduct this study. This chapter includes the purpose of this study, research questions, research design, participants, instrumentation, procedure, and data analysis.

## Purpose

The purpose of this descriptive quantitative survey study was to determine the impact clinical education has on radiology students' attitudes toward learning communication skills. A descriptive study is utilized to acquire knowledge regarding the characteristics of a distinct field of study (Burns & Grove, 2005). Survey research helps to make inferences about a population based on the responses of a relatively small sample (Babbie, 1990). Survey research has several inherent strengths such as measuring a wide variety of unobservable data such as peoples' preferences, traits, attitudes, beliefs, and behaviors (Bhattacherjee, 2012).

## Research Questions

The purpose of this descriptive study was to answer the following research questions:

1. What are the attitudes of radiology students toward learning communication skills based on clinical experience?
2. What are the attitudes of radiology students toward learning communication skills based on selected demographics?
3. What are radiology students' perceptions of classroom teaching and clinical modeling of communication?

## Research Design

A cross-sectional design was used which gathers data from a population at one point in time. This is an appropriate design because this study had no interventions or treatments and the

sample was from a predetermined population of radiology students at a specific point in their education. The cross-sectional study design is beneficial when describing variables and their distribution patterns (Hulley, Cummings, & Newman, 2013). For this study, the independent variables will include time spent in clinics and selected demographics (status in a program, age, gender, race, educational program attending, degree being sought, previous experience in healthcare, and prior military experience).

**Participants**

The length of the professional component of radiology programs used in the study is two years. To determine the influence clinical education has on the attitude toward learning communication skills, the population consisted of a cross-section of radiology students. Participants included pre-admitted students, those in their first year of formal education without clinical experience, those in their first year of formal education without clinical experience, those with less than 500 hours of clinical experience, and those in their second year of formal education with more than 500 hours of clinical experience. Typically, students participate in 1200 to 1800 hours of clinical experience for academic programs (Fortsch, Henning, & Nielsen, 2009). By setting the range of less that 500 hours and more than 500 hours allows for the opportunity to assess students' attitude during their beginning and late stages of clinical experience. Student samples were gathered from university-based programs offering a Bachelor of Science degree or certificate of completion, college-based programs offering an Associate in Science degree, and community college-based programs offering an Associate in Applied Science degree. Each program has JRCERT accreditation and must assess communication skills as part of the accreditation standards. The programs are geographically dispersed across the western, southwest, and southern regions of the United States.

**Sampling**

Convenience sampling was utilized for this study. A convenience sample relies on contacting members of a population who are easy to locate and willing to participate (Newcomer, Hatry, & Wholey, 2015). A convenience sample is justified when the intent is not to make inferences about an entire population, rather learn more about key issues (Newcomer et al., 2015). A convenience sample is an appropriate method for this study because the intent is to learn more about the issue of attitudes in radiology students toward learning communication skills which have not been identified in the past. Obtaining access to this population was done through the instructors for courses in which the students were enrolled who distributed the instrument.

A convenience sample of pre-admitted students was drawn from the introductory courses offered by each program. These introductory courses are a prerequisite to applying to the programs. Inclusion criteria include enrollment in the introductory courses which are offered every academic semester.

A convenience sample of first-year students was drawn based on the inclusion criteria of formal admission to a radiology program. First-year students were either admitted but have not started their clinical rotations or admitted and have less than 500 hours of clinical experience.

A convenience sample of second-year students was drawn based on the inclusion criteria of formal admission to a radiology program. Second-year students have completed more than 500 hours of clinical experience. Each program requires their students to build on prior clinical experience through sequential enrollment in clinical courses.

**Instrumentation**

This study was guided using the dependent variable of attitude toward learning communication skills. Independent variables include clinical experience ranging from 0 hours to more than 500 and demographic characteristics. Demographic characteristics included age, gender, and race. Additional independent variables included intuitional type, degree type, prior healthcare experience, highest level of education completed, and previous military experience (Appendix A).

The instrument used was the Communication Skills Attitude Scale (CSAS) (Appendix B). The CSAS has proven valid and reliable in a variety of healthcare disciplines which include but not limited to physicians, dentistry, and nursing (Laurence et al., 2012; Rees, Sheard, & Davies, 2002; Škodová, Bánovčinová, & Bánovčinová, 2018). The CSAS was developed to explore relationships between medical students' attitudes toward communication skills learning and their demographic and education-related variables (Rees et al., 2002). The CSAS is the most widely used tool for assessing student attitudes toward communication skills (Zhang, Jiang, Sun, Zhao, & Yu, 2018). The CSAS has been translated into various languages including German, Norwegian, and Korean (Ahn, Yi, & Ahn, 2009; Busch et al., 2015; Svensberg, Pharm, Brandlistuen, Bjornsdottir, & Sporrong, 2018). Despite its popularity in other disciplines, it has not, to the best of my knowledge, been used on radiology students.

The CSAS has 26 questions divided into 2 subscales; 13 questions are written in the form of positive attitude statements (PAS) and 13 written in the form of negative attitude statements (NAS). The original CSAS was designed for medical students training to be a physician. Permission was granted by the original author to use the CSAS for this study (Appendix C). To be relevant in radiology, keywords were changed to those most appropriate for this study

(Appendix D). These keyword edits are consistent with previous studies in disciplines such as dentistry and for cultural relevance such as Korean physicians (Ahn et al., 2009; Laurence et al. 2012). After reviewing the original CSAS survey, the term ‘doctor' was replaced with ‘radiologic technologist' in questions 1 and 19; ‘medical degree' was replaced with ‘radiology certification' for questions 3 and 21; ‘medicine' was replaced with ‘radiology' for questions 4, 22, and 23; and ‘medical' was replaced with ‘radiology' for question 26.

Each statement was answered using a 4-point Likert scale, ranging from 1, indicating strongly disagree, to 4, indicating strongly agree. This scale is a change from the 5-point scale used in the original survey. The change, which eliminated the ‘neutral’ option, was done to force the respondents to make a decision. This method has shown to reduce the misuse of the neutral option and minimize social desirability bias where responses are given to please the researcher and not provide a socially unacceptable answer (Chyung, Roberts, Swanson, & Hankinson, 2017; Garland, 1991). Omitting the midpoint may provide the participants’ real attitudes even though it could be socially undesirable (Johns, 2005). To ensure that a higher score represents a greater positive attitude, scores for the negative statements were reversed which is consistent with previous uses of the CSAS (Laurence et al., 2012; Svensberg et al., 2018).

To explore the presence of the hidden curriculum in radiology communication, four additional open-ended questions were added. These questions were meant to solicit the perception radiology students have of classroom teaching and clinical modeling of communication. The four additional open-ended questions asked were:

1. What behaviors do you believe reflect good communication while interacting with patients?

2. What communication behaviors have you observed in clinics that match those being taught pre-clinically in the classroom setting?
3. What communication behaviors have you observed in clinics that do not match those being taught pre-clinically in the classroom setting?
4. Describe what has had the greatest influence on the development of your radiology communication skills.

**Validity**

Validity is defined by Frankel and Wallen (2006), as, "Referring to the appropriateness, correctness, meaningfulness, and usefulness for the specific inferences researchers make based on the data they collect" (p.151). Previous studies have provided validity to the CSAS based on their discipline (Busch et al., 2015; Rees et al., 2002; Svensberg et al., 2018). Content validity was established for this study based on a pilot study.

The pilot participants included one student with less than 500 hours of clinical experience, one student with more than 500 hours of clinical experience, two radiology educators, one radiology department manager, and one recent radiology graduate and working technologist. Participants were asked to complete the survey and answer questions based on the timing, wording, and layout of the study. The pilot group indicated the all criteria were appropriate and content validity was established.

**Procedure**

An application for ethical review was made to the Institutional Review Board (IRB) at the University of Nevada Las Vegas. This study's application was approved and granted exempt status (Appendix E). The purpose of the ethical review was to ensure the research design protected the rights of those students who participated. A modification was needed after the

initial IRB approval was granted. This modification included a change to the quantification of clinical experience to specify between 1-500 hours and more than 500 hours. The modification was submitted to IRB and approved (Appendix F).

An electronic survey was created using Qualtrics. An invitation e-mail with an anonymous link was sent to the instructors or administrators of chosen programs who agreed to forward the survey to their students (Appendix G). A cover letter explaining the purpose, security, and voluntary nature of the study was included through the online link. Once consent was granted, the student could access the survey. All participants were able to respond to the CSAS and the first open-ended question. Only those students who were admitted to a program were allowed access to open-ended questions two through four. Once submitted, survey data was saved in Qualtrics for analysis. Weaknesses associated with survey research include non-response bias and sampling bias. Non-response bias relates to the prevalence of low-response rates for survey research and sampling bias relates to a disproportionate sample due to difficulties accessing a survey (Bhattacherjee, 2012), any of which threatens the validity of the study. To reduce non-response bias, reminders were sent one week after initial contact.

The survey was sent to a total of 406 students at five JRCERT college, community college, or university radiography programs geographically dispersed across the United States. A total of 256 students consented to take the survey, yielding a response rate of 63%. After examining the data, 20 students either consented to the survey and did not progress any further or consented to the survey and did not answer enough questions to provide any statistical data and were, therefore, deleted. A total of 232 students completed the survey, while 4 responded with partial completeness. This provided a 57% response rate for completed surveys.

**Principle Component Analysis**

A principle component analysis (PCA) was completed for this study. A PCA reduces dimensionality of a dataset and increases the interpretability by creating new and uncorrelated variables (Jolliffee & Cadima, 2016). Prior studies in other disciplines that used the CSAS incorporated a PCA as part of their initial analysis (Ahn et al., 2009; Anvik et al., 2007; Rees, Sheard, & Davies, 2002; Svensberg et al., 2018). A normal distribution for the variables is not necessary for a PCA (Jolliffee, 2002). This study represents the first use of the CSAS in radiology. Therefore, completing a PCA is appropriate and will add to the existing body of research on this topic.

Assessment of the feasibility of a study for PCA can be determined through the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity (Pallant, 2016). The KMO determines the strength of relationships between variables on a scale of 0 to 1 with .6 being the minimum acceptable level (Watson, 2017). Bartlett's test of sphericity provides an estimate of the intercorrelation between variables and is significant with a $p<.05$ (Watson, 2017). Results showed a PCA is feasible for this study with a KMO of .863 and Bartlett's test of sphericity of .000 (Table 1).

Table 1
*Principle Component Analysis Feasibility*

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | .863 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1905.892 |
| | df | 325 |
| | Sig. | .000 |

Determining the number of components is assessed by eigenvalues and scree plots. Eigenvalues represent the amount of explained variance within a given factor (Watson, 2017). Eigenvalues greater than 1 are deemed acceptable for factorial grouping. A Scree plot is a visual representation of extracted factors against their eigenvalues (Watson, 2017). Grouping of correlated variables into a simple factor structure is completed by factor rotation. The most common rotation method used when there is an expected minor to moderate correlation between variables is direct oblimin (Watson, 2017). The direct oblimin rotation produces three matrices: pattern, structure, and correlation. By using the pattern matrix, factors can be identified. The PCA with direct oblimin rotation of the 26 questions used for this study yielded 7 factors with eigenvalues >1 which explained 58% of the variance (Table 2).

Table 2
*Total Variance Explained by the Factors with Eigenvalues greater than 1*

| Factor | Initial eigenvalues | % of variance | Cumulative % of variance |
|---|---|---|---|
| 1 | 7.208 | 27.724 | 27.724 |
| 2 | 1.912 | 7.355 | 35.078 |
| 3 | 1.471 | 5.658 | 40.736 |
| 4 | 1.275 | 4.903 | 45.639 |
| 5 | 1.164 | 4.476 | 50.115 |
| 6 | 1.126 | 4.330 | 54.445 |
| 7 | 1.032 | 3.970 | 58.416 |

The scree plot suggested the CSAS for this study as having 1 factor which explained 28% of the variance (Figure 4). Previous studies with similar scree plots included up to 4 factors (Anvik et al., 2007; Laurence et al., 2012). The scree plot for this study shows a more consistent descent after the third factor; therefore, two factors were included. The seminal article for the CSAS also found two factors that were grouped based on the positively worded and negatively

worded questions (Rees, Sheard, & Davies, 2002). The two results for this study did not show such a clear delineation as there were negatively worded questions included in the first factor.

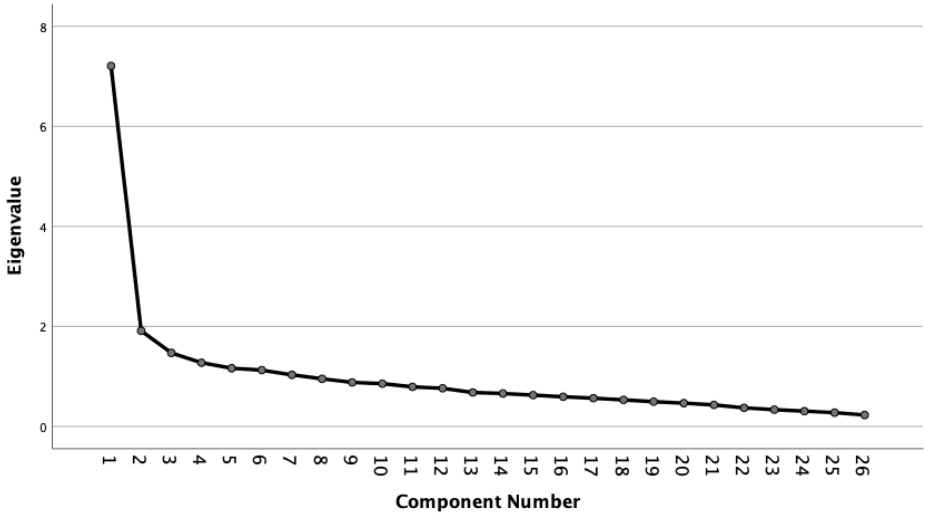


*Figure 4.* Scree plot of extracted factors for the CSAS against their eigenvalue

The inclusion of the questions for each factor was determined by establishing a threshold for each loading factor of 0.4 and at least .10 lower on another which is consistent with prior studies using the CSAS (Anvik et al., 2007; Zhang, Jiang, Sun, Zhao, & Yu, 2018). As a general rule, loading factors greater than .33 are considered the minimum for practical significance (Ho, 2014). The results of the pattern matrix after rotation and exclusion of questions that did not meet the loading factor threshold revealed 24 questions for analysis (Appendix H). Question seven was retained because it exceeded the threshold set by this study of >.4 for component 1, which was above the minimum acceptable level of >.33, and the loading factor for component 2 was below the minimum acceptable level of >.33 (Ho, 2014). In addition, question 7 asks, "Learning communication skills is interesting" which can be directly related to a students'

attitude and the intent of this study. These 24 questions were labeled as the CSAS for Radiology (CSAS-R) (Appendix I).

Factor 1 consists of fifteen questions (Appendix J), of which twelve are positively worded (4, 5, 7, 9, 10, 12, 14, 16, 18, 21, 23, 25) and three are negatively worded (2, 19, 26). Factor 1 is labeled "Value" because each item describes the benefits learning communication skills can provide to the individual. For example, question five states, "Learning communication skills has helped or will help me respect patients."

Factor 2 consists of 9 questions (Appendix K), of which all are negatively worded (3, 6, 8, 11, 13, 15, 17, 22, 24). Factor 2 is labeled “Importance” because each question relates to the perceived significance the student has toward the teaching and learning communication skills to be a technologist. For example, question three states, “Nobody is going to fail their radiology certification for having poor communication skills.” Further analysis will include the CSAS-R as well as the subscales *Value* and *Importance*.

**Reliability**

Reliability is defined by Carmines and Zeller (1983) as, “The tendency toward consistency found in repeated measures of the same phenomenon” (p.12). Internal reliability for each scale was calculated using Cronbach’s alpha coefficient. Reliability was established for this study (Table 3). All scales showed acceptable reliability with Cronbach’s alpha scores >.7 (CSAS-R .89; Value .88; Importance .72).

Table 3
*Reliability for CSAS-R, Value, and Importance*

| Tool | Cronbach’s Alpha | Number of items |
|---|---|---|
| CSAS-R | .885 | 24 |
| Value | .880 | 15 |
| Importance | .723 | 9 |

**Data Analysis**

Data analyses included descriptive statistics based on the use of convenience sampling methods. Descriptive statistics are used to classify and summarize numerical data but cannot make generalizations about a population that is based on convenience sampling (Hinkle, Wiersma, & Jurs, 2003). Due to convenience sampling procedure, inferential statistics were not utilized. Surveys were collected via Qualtrics and data transferred into SPSS version 26 (SPSS Inc., Chicago IL).

Research question one assessed the attitude of radiology students toward learning communication based on clinical experience. Descriptive statistics such as frequencies, means, and standard deviations were used to report clinical experience. Data were presented for the CSAS-R as well and the *Value* and *Importance* subscales. Spearman rank correlation coefficient analyses were used to determine the strength of relationship between *Value* and *Importance* subscales. The Spearman rank correlation coefficient is the appropriate measure of correlation for this study. A test for normality was run on the CSAS-R and subscales "Value" and "Importance." It was determined the distribution of scores is not normal based on results from the Shapiro-Wilk test. Neither the CSAS-R or subscales Value and Importance achieved normality based on Shapiro-Wilk results of $p<.05$. Due to the non-parametric nature of this study, lack of normality, and ordinal nature of the survey data, the Spearman rank correlation coefficient is the most appropriate method for assessing the relationship of the variables (Allen, 2017; Sedgwick, 2014).

Research question two assessed participants' attitudes toward learning communication skills and selected demographics. The data were analyzed using descriptive statistics

(frequencies, means, and standard deviations) to assess clinical experience. Data were presented for the CSAS-R as well and the *Value* and *Importance* subscales.

Research question three assessed students' perceptions of classroom teaching and clinical modeling of communication. Data resulted from four open-ended questions which were coded and categorized into major themes. Descriptive statistics (frequencies and percentages) were used to summarize the data.

**Summary**

Chapter 3 explained the design for this descriptive quantitative survey study. A cross-sectional design was used to gather data from the sample who were at varying stages of training. The population included radiology students who are not formally admitted to a program, those who have only begun their training, and those who are close to graduation. A convenience sampling method was utilized to and gathered from the population. It is acknowledged that using a convenience sampling method will not allow for generalizability to the larger population of radiology students. However, this study is exploratory, and the intent is to learn more about an issue not previously studied.

The well-known Communications Skills Attitude Scale (CSAS) survey was modified and used for this study. Permission from the original author of the CSAS was obtained as was IRB approval. Data analysis included descriptive statistical calculations.

## CHAPTER 4: Results

The purpose of this cross-sectional descriptive quantitative study was to determine the influence clinical education has on the radiology students' attitudes toward learning communication skills. Additionally, this study explored the association between classroom teaching and clinical modeling of communication. The sample for this study consisted of radiology students at various stages of training. The students sampled included those not yet admitted to a radiology program, admitted students without clinical experience, admitted students with less than 500 hours of clinical experience, and admitted students with more than 500 hours of clinical experience. The sample students were drawn from JRCERT accredited radiology programs of West, South, and Midwest regions of the United States. Access to the sample was completed via convenient sampling methods by soliciting instructors or administrators from radiology programs. A total of 406 students were solicited with 256 consenting to the study and 236 finished the survey in part or in full yielding a response rate of 58%. All data were collected from May 2019 through September 2019.

This chapter will present the results of the study which was designed to answer the following research questions:

1. What are the attitudes of radiology students toward learning communication skills based on clinical experience?
2. What are the attitudes of radiology students toward learning communication skills based on selected demographics?
3. What are radiology students' perceptions of classroom teaching and clinical modeling of communication?

**Research Question One**

Question one sought to assess students' attitudes toward learning communication skills based on clinical experience. The independent variables were categorized into students with no clinical experience, students with less than 500 hours of clinical experience, and students with more than 500 hours of clinical experience. Descriptive parameters including frequencies, means, and standard deviations were used to organize and summarize the data. Spearman correlation coefficient (rho) was conducted to determine the strength of relationship between the following two subscales: *Value* and *Importance*.

A total of 236 students responded and provided their clinical experience (Table 4). The majority of respondents 64% (n=150) were students without clinical experience. It is typical for a radiography program to have limited entry. As a result, there are more pre-radiology students than admitted. At the time the survey was distributed, many of the sampled programs had students in the early stages of clinical training.

Table 4
*Frequency Distributions of Survey Responses by Clinical Hours*

| Variable | N | % |
|---|---|---|
| Clinical Hours | | |
| 0 | 150 | 63.6 |
| 1-500 | 65 | 27.5 |
| 500+ | 21 | 8.9 |
| Total | 236 | 100 |

Results of the CSAS-R show an initial rise in attitude toward learning communication skills as students start their clinical education which decrease as they gain more experience (Figure 5). Previous studies using the CSAS in other healthcare disciplines did not use clinical

hours to indicate progression, using instead, years of training. These findings are consistent with dental and medical students whose attitudes decrease as students' progress from their first year of training to their last (Laurence et al., 2012; Usman & Siddiqui, 2018).

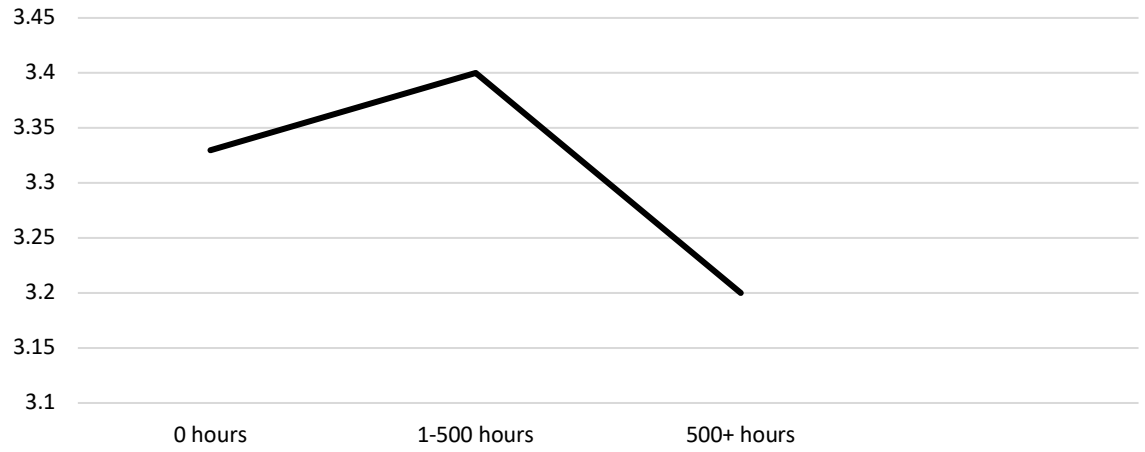


*Figure 5*. Attitude mean scores of the CSAS-R by clinical hours

Table 5 shows the variation in mean scores from students with no clinical experience to those toward the end of their training. By using students with no clinical experience as a baseline, there is a decrease in attitude toward learning communication skills as students' progress in their clinical training.

Table 5
*Mean Scores of CSAS-R by Clinical Hours*

| Variable | N | Mean | SD |
|---|---|---|---|
| Clinical Hours | | | |
| 0 | 150 | 3.33 | .298 |
| 1-500 | 65 | 3.40 | .336 |
| 500+ | 21 | 3.20 | .325 |

*Note.* SD = Standard Deviation

Analysis of the *Value* subscale shows a similar pattern to the CSAS-R with an initial rise in attitude then decreases with more clinical experience (Figure 6).

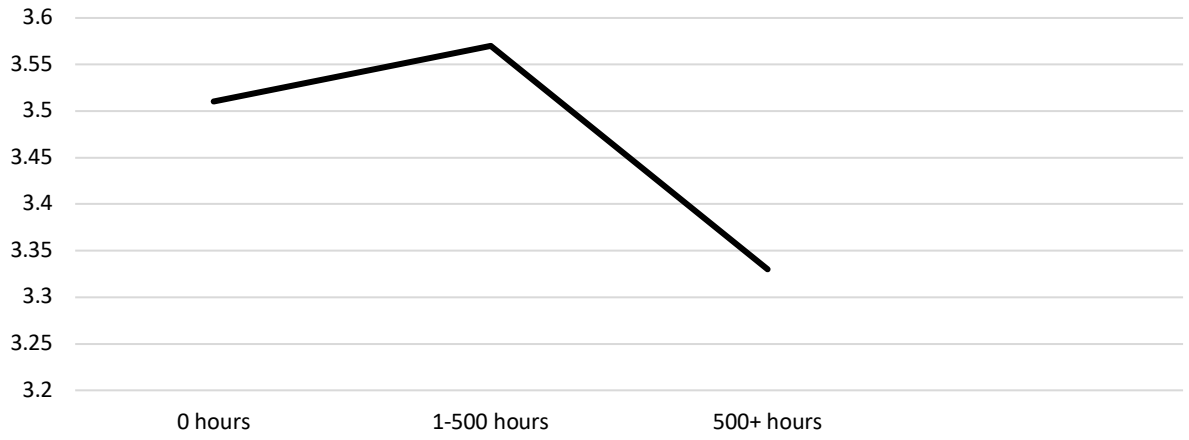


*Figure 6.* Attitude mean scores on the *Value* subscale by clinical hours

Those with 1-500 hours of clinical experience had the highest attitude regarding the value of learning communication skills (M=3.57; SD=.365). Table 6 shows the variation in mean scores for the perceived value toward learning communication skills with no clinical experience to those toward the end of their training.

Table 6
*Mean Scores toward Value by Clinical Hours*

| Variable | N | Mean | SD |
|---|---|---|---|
| Clinical Hours | | | |
| 0 | 150 | 3.51 | .330 |
| 1-500 | 65 | 3.57 | .365 |
| 500+ | 21 | 3.33 | .377 |

*Note.* SD = Standard Deviation

Analysis of the *Importance* subscale also show an initial rise in attitude toward learning communication skills then decrease; however, the difference is not as pronounced as the CSAS-R or Value subscale (Figure 7).

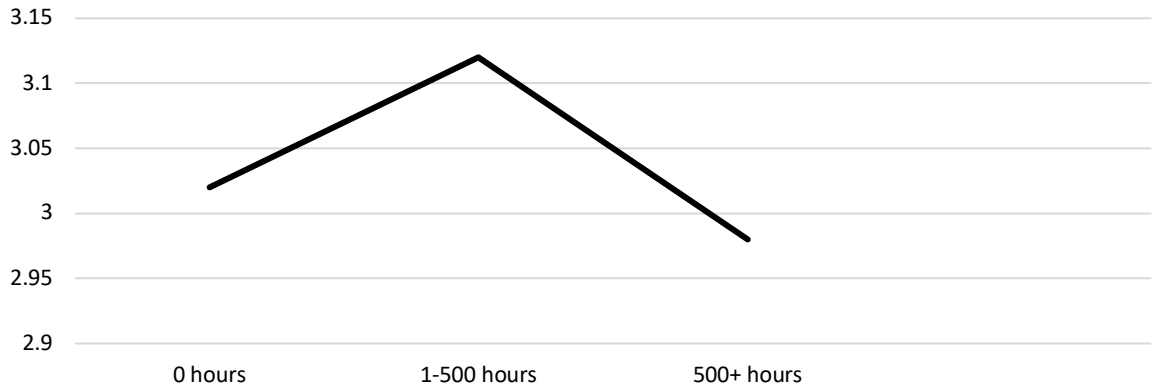


*Figure 7.* Attitude mean scores on the *Importance* subscale by clinical hours.

Those with 1-500 hours of clinical experience had the highest attitude regarding the importance of learning communication skills (M=3.12; SD=.407). Table 7 shows the variation in mean scores for the perceived importance of learning communication skills with no clinical experience to those toward the end of their training.

Table 7
*Mean Scores toward Importance by Clinical Hours*

| Variable | N | Mean | SD |
|---|---|---|---|
| Clinical Hours | | | |
| 0 | 150 | 3.02 | .366 |
| 1-500 | 65 | 3.12 | .407 |
| 500+ | 21 | 2.98 | .317 |

*Note.* SD = Standard Deviation

Spearman rank correlation coefficient was conducted to assess the relationship between clinical experience and the attitude toward learning communication skills based on perceived

*Value* and *Importance* (Table 9). Conventions developed by Davis (1971) were used for describing the correlations (Table 8).

Table 8
*Spearman Rank Correlation Coefficient Level of Association*

| Level of Association | Correlation Coefficient Range |
|---|---|
| Very strong | .70-1.0 |
| Substantial | .50-.69 |
| Moderate | .30-.49 |
| Low | .10- .29 |
| Negligible | .01- .09 |

There was a substantial significant positive relationship found for each clinical group. The more substantial relationship was found with those having more than 500 hours ($r_s$=.659, p<.005). Those with more than 500 hours have the lowest attitude toward learning communication skills. Theses correlative findings provide an opportunity for a possible curricular intervention that may improve the overall attitude of students with more than 500 hours.

Table 9
*Spearman Rank Correlations of Value and Importance by Clinical Hours*

| Clinical Hours | Variable | Value | Importance |
|---|---|---|---|
| 0 | | | |
| | Value | | |
| | Spearman Correlation | 1 | .557* |
| | Sig (2-tailed) | | .000 |

| | | | |
|---|---|---|---|
| | Importance | | |
| | Spearman Correlation | .557* | 1 |
| | Sig (2-tailed) | .000 | |
| | N | 150 | |
| 1-500 | Value | | |
| | Spearman Correlation | 1 | .545* |
| | Sig (2-tailed) | | .000 |
| | Importance | | |
| | Spearman Correlation | .545* | |
| | Sig (2-tailed) | .000 | |
| | N | 65 | |
| 500+ | Value | | |
| | Spearman Correlation | | .659* |
| | Sig (2-tailed) | | .001 |
| | Importance | | |
| | Spearman Correlation | .659* | |
| | Sig (2-tailed) | .001 | |
| | N | 21 | |

*Note.* *Correlation is significant at p<.05

**Research Question 2**

Question two sought to assess the attitude toward learning communication skills based on selected demographics. The selected demographics included: status in a program, age, gender, race, educational program attending, degree being sought, previous experience in healthcare, and prior military experience. Descriptive analyses which included frequencies, means, and standard deviations were calculated based on data from the CSAS-R and the two subscales, *Value* and *Importance*.

**Status in a Program**

The criteria for status in a program were divided into "Not admitted into a program" or "Admitted into a program." There were a total of 236 responses, of which those not admitted to a program had a slight majority making up 50.4% (n=119) of the total sample. Those not admitted were taking pre-requisite courses in an effort to apply for admission to a radiology program. Descriptive data including frequency distributions, means, and standard deviations were calculated for the CSAS-R, *Value*, and *Importance* subscales which are presented in Table 10.

Table 10
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Education Status*

| Education Status | N (%) | Mean CSAS-R (SD) | | Mean Value (SD) | | Mean Importance (SD) | |
|---|---|---|---|---|---|---|---|
| Not Admitted | 119 (50.4) | 3.37 | (.319) | 3.55 | (.349) | 3.07 | (.407) |
| Admitted | 117 (49.6) | 3.29 | (.306) | 3.47 | (.343) | 3.01 | (.338) |

*Note.* SD = standard deviation.

Results show those not admitted to a program have a greater overall attitude toward learning communication skills in all scales. Those not admitted are still involved in pre-clinical education which includes the theoretical concepts of communication.

**Age**

Age was divided into six ranges from eighteen to thirty-eight or older. Of the 236 completed surveys, fifteen did not provide information regarding age yielding a total of 221. The majority of students 60% (n=133) were between 18-21 which is above the national average of 43% for total students ages 18-21 enrolled in a postsecondary institution (National Center for Education Statistics, 2019). Descriptive data including frequencies, means, and standard

deviations were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 11.

Table 11
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Age*

| Age | N (%) | Mean CSAS-R (SD) | | Mean Value (SD) | | Mean Importance (SD) | |
|---|---|---|---|---|---|---|---|
| 18-21 | 133 (60) | 3.34 | (.316) | 3.52 | (.344) | 3.03 | (.408) |
| 22-25 | 54 (24) | 3.33 | (.314) | 3.50 | (.365) | 3.04 | (.334) |
| 26-29 | 13 (6) | 3.31 | (.222) | 3.48 | (.279) | 3.02 | (.221) |
| 30-33 | 8 (4) | 3.65 | (.287) | 3.79 | (.232) | 3.43 | (.430) |
| 34-37 | 7 (3) | 3.23 | (.366) | 3.32 | (.393) | 3.06 | (.332) |
| 38+ | 6 (3) | 3.15 | (.427) | 3.27 | (.499) | 2.96 | (.395) |

*Note.* SD = Standard deviation

Results show those between the ages of 30-33 had the highest attitude toward learning communication skills based on the CSAS-R (M=3.65; SD=.287) and those 38 and older had the lowest (M=3.15; SD=.427). These age ranges define the non-traditional students which include those over 25 years old and make up 37% of undergraduate students (National Center for Education Statistics, 2019). The sample size for those over 25 is small and warrants additional research.

**Gender**

Gender was divided into “Male”, “Female”, or “Prefer to not answer.” Of the 236 completed surveys, fifteen did not provide information regarding gender yielding a total of 221 and one selected the “prefer not to answer” option. The majority of respondents were female 80% (n=178). This is representative of the population for radiologic technologists, with females making up 77% of all technologists in the United States (ASRT wage survey, 2019). With only one respondent choosing “prefer not to answer”, there is not enough data to report for that

category. Descriptive data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 12.

Table 12
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Gender*

| Gender | N (%) | Mean CSAS-R (SD) | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| Male | 42 (19) | 3.31 (.320) | 3.47 (.382) | 3.02 (.409) |
| Female | 178 (80.5) | 3.34 (.320) | 3.52 (.344) | 3.05 (.380) |

*Note.* SD = Standard deviation

Results show females have a greater attitude toward learning communication skills based on scales. These findings are consistent with other studies using the CSAS (Anvik et al., 2008; Cleland et al., 2005; Laurence et al., 2012; Svenberg et al., 2018; Wright et al., 2006). Consistently, females show a higher attitude toward learning communication skills. Findings in this study do not show as large a gap between genders as previous studies have found.

**Race**

Student race was divided into six categories: Caucasian, African American, Latino, Asian, Pacific Islander, Native American, and prefer not to answer. Of the 236 completed surveys, fifteen did not provide information regarding race yielding a total of 221 and one being Native American. Caucasians represent the majority of the respondents 52% (n=116). This is representative of the national population of undergraduate students in the United States, with 54% identified as White (National Center for Education Statistics, 2019). The “Other” category represents 4% (n=8) of the sample. A write-in option was offered, and responses included Middle Eastern (n=1), Caribbean (n=1), and Mixed (n=5). This too is representative of the national undergraduate population with 4% identified as having two or more races (National

Center for Education Statistics, 2019). With only one respondent for Native American, there is not enough data to report for that category. Descriptive data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 13.

Table 13
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Race*

| Race | N (%) | Mean CSAS-R (SD) | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| Caucasian | 116 (53) | 3.33 (.330) | 3.49 (.362) | 3.06 (.373) |
| Asian | 44 (20) | 3.28 (.322) | 3.46 (.402) | 2.98 (.388) |
| Latino | 32 (14) | 3.37 (.263) | 3.57 (.254) | 3.03 (.381) |
| African American | 13 (6) | 3.40 (.355) | 3.62 (.334) | 3.03 (.513) |
| Other | 8 (4) | 3.44 (.395) | 3.61 (.348) | 3.17 (.486) |
| Pacific Island | 7 (3) | 3.39 (.251) | 3.57 (.301) | 3.10 (.207) |

*Note.* SD = Standard deviation

Results show those in the "Other" category have the highest attitude toward learning communication skills based on the CSAS-R and the Importance subscale. African American students reported the greatest attitude for the Value subscale. Collectively, those identified as "Other" and African American represent 9% of the sample and warrants further consideration. Asian students had the lowest attitude across all scales and most substantial on the Importance subscale. Previous uses of the CSAS on Korean medical students indicate a skepticism about the need to learn communication skills in medical school (Ahn et al., 2009).

**Educational Program**

Educational programs were divided into six categories: university, college, community college, proprietary, hospital-based, and other. Only two categories received responses with University-based programs represented the majority of the sample 95% (n=209). Descriptive

data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 14.

Table 14
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Educational Program*

| Educational Program | N (%) | Mean CSAS-R (SD) | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| University | 209 (95) | 3.34 (.325) | 3.51 (.358) | 3.05 (.386) |
| College | 10 (5) | 3.28 (.215) | 3.50 (.265) | 2.90 (.361) |

*Note.* SD = Standard deviation

Results show university students have a higher attitude toward learning communication skills based on all scales. There is a bias toward universities and a limitation of this study. Future research should attempt to be more inclusive to other institutions such as community college and proprietary programs.

**Degree**

Degrees were divided into baccalaureate, associates, certificate, or other. The majority of the respondents 97% (n=214) will obtain a baccalaureate degree. Descriptive data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 15.

Table 15
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Degree*

| Educational Program | N (%) | Mean CSAS-R | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| Baccalaureate | 214 (97) | 3.34 (.321) | 3.51 (.356) | 3.05 (.381) |
| Associate | 2 (1) | 3.29 (.177) | 3.67 (.000) | 2.67 (.471) |
| Certificate | 2 (1) | 3.79 (.321) | 3.73 (.377) | 3.06 (.550) |

*Note.* SD = Standard deviation

Results show certificate students have a higher attitude across all scales. However, this represents 1% of the sample and there is a bias toward baccalaureate students. Future research should attempt to be more inclusive to other degrees.

**Highest Level of Education**

The highest level of education completed was divided into High School diploma, GED, Associates degree, Baccalaureate degree, Graduate degree, or Other. The majority of the respondents completed a high school diploma 70% (n=155). Those who chose Other 2.5% (n=6) were offered a write-in option which resulted in some college (n=5) and trade school (n=1). Descriptive data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 16.

Table 16
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Highest Level of Education*

| Highest Education | N (%) | Mean CSAS-R (SD) | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| H.S. Diploma | 155 (70) | 3.34 (.321) | 3.49 (.344) | 3.03 (.387) |
| Associate Degree | 44 (20) | 3.45 (.324) | 3.64 (.340) | 3.12 (.395) |
| Baccalaureate Degree | 12 (5) | 3.13 (.326) | 3.25 (.398) | 2.94 (.319) |
| Graduate Degree | 3 (1.4) | 3.44 (.301) | 3.76 (.204) | 2.93 (.570) |
| Other | 6 (2.5) | 3.42 (.195) | 3.63 (.256 | 3.06 (.270) |

*Note.* SD = Standard deviation

Results show those who completed an associate degree had the highest attitude based on the CSAS-R and Importance subscale. Those who completed a graduate degree had the highest attitude on the Value subscale yet lowest for the Importance subscale. Those who have completed a graduate degree represents a small portion of the sample (1.4%) which should be

taken into consideration. Those who have completed a baccalaureate degree had the lowest attitude for the CSAS-R and Value subscale.

**Previous Healthcare Experience**

Answers for previous healthcare experience were divided into "Yes" or "No." The majority of respondents 75% (n=166) did not have previous healthcare experience. Descriptive data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 17.

Table 17
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Previous Healthcare Experience*

| Healthcare Experience | N (%) | Mean CSAS-R (SD) | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| Yes | 55 (25) | 3.38 (.296) | 3.56 (.337) | 3.08 (.354) |
| No | 166 (75) | 3.32 (.327) | 3.49 (.357) | 3.03 (.394) |

*Note.* SD = Standard deviation

Results show those who had previous healthcare experience had a higher attitude toward learning communication skills across all scales. This is consistent with previous research which indicate those with prior experience in health services, but with no prior health education has a higher attitude toward communication skills (Anvik et al., 2008).

**Military Experience**

Answers for military experience were divided into "Yes" or "No." The majority of respondents 96% (n=211) did not have previous military experience. Descriptive data including frequency, mean, and standard deviation were calculated for the CSAS-R, Value, and Importance scales which are presented in Table 18.

Table 18
*Frequency Distributions and Mean Scores of CSAS-R, Value, and Importance by Military Experience*

| Military Experience | N (%) | Mean CSAS-R (SD) | Mean Value (SD) | Mean Importance (SD) |
|---|---|---|---|---|
| Yes | 10 (5) | 3.15 (.336) | 3.19 (.474) | 3.08 (.235) |
| No | 211 (95) | 3.34 (.317) | 3.53 (.340) | 3.04 (.390) |

*Note.* SD = Standard deviation

Results show those who did not have previous military experience had a higher attitude toward learning communication skills based on the CSAS-R and Value subscale. Those who did have previous military experience had a higher attitude regarding the Importance of learning communication skills. There are no previous studies using the CSAS that assessed military experience. This provides an opportunity for future research.

## Research Question Three

Research question three is meant to explore the concept of the hidden curriculum in radiology pertaining to communication skills. Students were asked four open-ended questions pertaining to their perception of what good communication skills were, communication skills seen in clinics that matched pre-clinical training, communication skills seen in clinics that did not match pre-clinical training, and those who were most influential on the communication styles. Answers were categorized into themes and codes for quantitative analysis.

### Open-Ended Question One

Question one asked, "What behaviors do you believe reflect good communication while interacting with patients?" All participants were asked this question no matter their educational status which yielded 197 responses. Each response was coded based on the behavior that was given. These behaviors were then categorized into themes (Table 19).

Table 19
*Responses to Behaviors Reflecting Good Communication*

| Behaviors reflecting good communication | Number of Responses |
|---|---|
| **Interpersonal Skills** | 58% (n=148) |
| Empathy | |
| Listening | |
| Eye-Contact | |
| Posture | |
| Confidence | |
| Tone of Voice | |
| **Procedural** | 23% (n=58) |
| Explain the exam | |
| Give instructions | |
| Get the image | |
| **Respect** | 17% (n=44) |
| Manners | |
| Patience | |
| Polite | |
| Friendly | |
| **Engage in conversation** | 2% (n=4) |

The major themes identified were: Interpersonal skills (non-verbal), procedural, and respect. There was one additional behavior that did not fit into the major themes, engaging in conversation. The behaviors included with interpersonal skills include those verbal and non-verbal that enhance a patient's experience (Bachmann et al., 2017). Results from this study regarding interpersonal skills include empathy, eye-contact, posture (body language and open arms), facial expressions (smiling and nodding), tone of voice, and confidence. Behaviors found within the category of procedural support previous research that found technologists feel their communication styles are more related to the exam (Hadley & Watson, 2016). Procedural behaviors found in this study include explaining the exam, giving instructions, and getting a good image. Respect was a separate category because the behaviors given were broad and could encompass either interpersonal or procedural communication. Behaviors within respect include

having manners and patience or being polite and friendly. Engaging in the conversation could be placed into any of the major theme depending on context; therefore, it was kept separate.

Many responses included multiple behaviors. For example, "Good communication skills require that you are a good listener, body language, eye contact, and tone of voice all reflect in how good your communication skills are. Having confidence in what you say, so it helps to show patients you really have been listening to what they say." This response included five recorded behaviors: listening, body language (posture), eye-contact, tone of voice, and confidence. Some responses involved multiple themes such as, "Being friendly while giving instructions to patients." This response describes behaviors for respect (friendly) and procedure (giving instructions).

There were 254 behaviors identified that students perceived reflected good communication skills. The predominant behaviors 58% (n=148) involve interpersonal skills (non-verbal). The remaining behaviors, 23% (n=58) involve procedure, 17% (n=44) involve respect, and 2% (n=4) involve engaging in conversation.

**Open-Ended Question Two**

Question two asked, "What communication behaviors have you observed in clinics that match those being taught pre-clinically in the classroom setting?" Only those students admitted to a program were able to respond to this question. A total of 90 individual responses were recorded. There was a total of 25 responses eliminated. Those eliminated were students admitted to a program but not having started clinics (n=15) and unable to provide an answer, those who answered, "I don't know" (n=6), and responses that included the names of didactic courses instead of behaviors (n=4). Each applicable response was coded based on the behavior that was given. These behaviors were then categorized into themes (Table 20).

Table 20
*Responses to Behaviors seen in Clinics that match Pre-clinical Teaching*

| Behaviors seen in clinics that match pre-clinical teaching | Number of Responses |
|---|---|
| **Procedural** | 49% (n=34) |
| Explain the exam | |
| Give instructions | |
| Gather information | |
| **Interpersonal skills** | 17% (n=12) |
| Empathy | |
| Listening | |
| Tone of voice | |
| Eye-contact | |
| **Engaging** | 12% (n=8) |
| Interacting with the patient | |
| Building a rapport | |
| Answering questions | |
| **Respect** | 10% (n=7) |
| Being kind | |
| Being polite | |
| **Teamwork** | 9% (n=6) |
| Working together | |
| Talking with nurses/doctors | |
| **Confidentiality** | 3% (n=2) |
| Not talking in the hallways | |
| Not diagnosing | |

The major themes identified were interpersonal skills, procedure, respect, engaging, teamwork, and confidentiality. The behaviors included with interpersonal skills include empathy, listening, eye contact, and tone of voice. The behaviors included with procedure include explaining the exam, giving instructions, and gathering information (taking a history, verify patient name, etc.). The behaviors included with respect include respectful, kind, and polite. The behaviors included with engaging include interacting with the patient, building a rapport, or answering questions. The behaviors included with teamwork include working together and

talking with other personnel, such as nurses or doctors. The behaviors included with Confidentiality include not talking in the hallways and not telling the patient what is seen.

Some responses included multiple behaviors across themes. For example, "Making eye contact with the patient. Giving clear instructions. Making sure the patient actually understands what is going to occur. Allowing the patient to ask questions." This response includes three behaviors: eye contact, giving instructions, and answering questions. These behaviors were categorized in interpersonal skills, procedure, and engaging themes.

There were 25 responses eliminated due to the answers not identifying a behavior (n=4), students admitted to a program but not yet in clinics (n=15), or those who responded with “I don’t know” (n=6). The remaining 65 responses yielding 69 different communication behaviors that were observed in clinics that match those taught pre-clinically in the classroom setting. The most frequent behaviors 49% (n=34) were categorized under procedure. The remaining behaviors that were categorized into interpersonal skills 17% (n=12), engaging 12% (n=8), respect 10% (n=7), teamwork 9% (n=6), and confidentiality 3% (n=2).

**Open-Ended Question Three**

Question three asked, “What communication behaviors have you observed in clinics that do not match those being taught pre-clinically in the classroom setting?” Only those students admitted to a program were able to respond to this question. A total of 85 individual responses were recorded. There were 15 eliminated. Those eliminated were students admitted to a program but not in clinics (n=11) and those responses that did not answer the question (n=4). Each applicable response was coded based on the behavior that was given. These behaviors were then categorized into themes (Table 21).

Table 21
*Responses to Behaviors seen in clinics that do not match Pre-clinical Teaching*

| Behaviors seen in clinics that do not match pre-clinical teaching | Number of Responses |
|---|---|
| **No difference** | 35% (n=25) |
| **Informal communication** | 22% (n=16) |
| Small talk | |
| Using non-clinical terms | |
| Non-verbal gestures | |
| **Critical thinking** | 22% (n=16) |
| Dealing with difficult patients | |
| Dealing with mental illness | |
| Adapting to trauma | |
| **Negative communication** | 13% (n=9) |
| Rude technologist | |
| Unethical technologist | |
| **Interprofessional communication** | 8% (n=6) |
| Communicating with doctors | |
| Communicating with other healthcare personnel | |

The major themes identified were no difference, negative differences, positive differences, critical thinking, and interprofessional communication. Those who responded with answers such as, “None” or “I haven’t observed any” were categorized under no difference. Behaviors identified with negative differences include rude, angry, or unethical communication toward patients. Examples of negative communication include, “Techs losing their temper and being brisk with patients”, “Some techs are not as nice to their patients as we have been taught to be”, or “A tech not following their scope of practice and telling the patient the pathology they see on their image.”

Behaviors identified with informal communication include those interactions that can only happen when dealing with real patients and not with other students in a controlled classroom setting. Examples of positive differences include, “Going beyond asking how is your day and maybe even trying to make a patient laugh”, “When we’re being taught, it seems as if

we must be serious the whole time, but after being in clinics I've realized that most patients just want you to smile with them and be able to have a sense of humor", and "Using terms such as arm instead of anatomically correct words such as humerus. Use words that the patient can understand."

Behaviors identified with critical thinking include situations students did not feel they were adequately prepared for when they started clinics. These situations include difficult patients, mental illness, and trauma. Examples of critical thinking include, "I've had several patients that get upset, yelling, and moving around. A lot of my class did not talk about this", "We aren't really taught or guided how to communicate with patients who have Downs Syndrome or dementia", and "The experience with trauma patients."

Behaviors identified with interprofessional communication deal with the interactions among other healthcare professionals that students did not feel prepared to handle. Examples of interprofessional communication include, "Something that did not match pre-clinically was communication with the doctors" or "Dealing with difficult coworkers."

There were 15 responses eliminated due to students admitted to a program but not in clinics (n=11) and responses that did not answer the question (n=4). The remaining 70 responses yielded 72 different communication behaviors that were observed in clinics that did not match those taught pre-clinically in the classroom setting. The most frequent response was No Difference 35% (n=25). The remaining behaviors were categorized into Informal Communication 22% (n=16), Critical Thinking 22% (n=16), Negative Communication 13% (n=9), and Interprofessional Communication 8% (n=6).

**Open-Ended Question Four**

Question four asked, "Describe what has had the greatest influence in the development of your radiology communication skills." Only those students admitted to a program were able to respond to this question. A total of 89 individual responses were recorded. Six responses were eliminated which answered, "N/A", or "Nothing". Each applicable response was coded based on the behavior that was given. These behaviors were then categorized into themes (Table 22).

Table 22
*Responses to the Greatest Influence in the Development of Communication Skills*

| Greatest influence in the development of communication skills | Number of Responses |
|---|---|
| **Environment** | 42% (n=35) |
| Being in clinics | |
| Being in a hospital | |
| Being with patients | |
| **Technologists** | 28% (n=24) |
| **Classes** | 17% (n=14) |
| Professors | |
| Lecture courses | |
| Laboratory courses | |
| **Prior Experience** | 7% (n=6) |
| Customer service | |
| Sales | |
| **Self-Motivation** | 6% (n=5) |
| Desire to be a better healthcare professional | |
| Gaining confidence | |

The major themes identified were class, technologists, environment, prior experience, and self-motivation. Influences found with classes include a specific course or didactic instructors whom students do not interact within clinics. Examples of class responses include, "The professors have the greatest influence because they have used their communication skills in the field", "RAD 117", or "My instructors during lab times doing mock imaging procedures."

Influences found with technologists include those imaging professionals the students work with and are supervised by in clinics. Examples of technologist responses include, “Emulating certain techs in clinics”, “Watching the techs communicate with patients and each other”, or “Feedback from registered technologists has made a significant impact.”

Influences found with the environment include being physically present in clinics and immersed in the work of radiology. Examples of environment responses include, “Working in the hospital and just getting comfortable with my surroundings has helped me the most with learning communication skills”, “The time I spent in clinics”, or “Personal experience and plenty of clinical experience.”

Influences found with prior experience include work outside of radiology. Examples of prior experience include, “Working in sales or customer service having had years of getting customers from being angry to happy” and “Using what I learned in customer service over the years.”

Responses for self-motivation include internal influences that do not specify a person or event. Examples of self-motivation responses include, “Desire to become a better healthcare professional” or “Desire to become the best medical professional I can be.”

There were six responses eliminated that did not provide an answer that could be categorized. The remaining 82 responses yielded 84 different influences that developed the students’ radiology communication skills. The most frequent response was environment 42% (n=35). The remaining influences were categorized into technologist 28% (n=24), class 17% (n=14), prior experience 7% (n=6), and self-motivation 6% (n=5).

**Summary**

Analysis of the data shows there is an initial increase in radiology students' attitudes toward learning communication skills once they begin clinical training, which then decreases as they gain more experience. There is a greater decrease in attitude toward the value they see in learning communication skills the longer they are involved in clinical education. Correlation analysis shows there is a significant yet moderate positive relationship between the importance they feel learning communication skills have and its effect on their perceived value toward learning communication skills. In addition, those not yet admitted to a radiology program show a greater attitude toward learning communication skills compared to those who are admitted.

Demographic analysis shows female students age 30-33 have the greatest attitude, yet females age 18-21 were the most prevalent. Students with a mixed ethnicity have a greater attitude; however, African American students had a slightly higher attitude toward the value of learning communication skills. Those students at a university-based program who have previously completed an associate degree were shown to have an overall greater attitude. However, those who have previously completed a graduate degree have a greater attitude toward the value learning communication skills can bring. Those with previous healthcare experience have a greater attitude as does those without military experience. However, those with military experience were shown to have a greater attitude toward the importance of learning communication skills.

Finally, students feel the ideal behaviors for good communication primarily include interpersonal aspects. The behaviors modeled in clinics focus more on the procedural component of the job and less on interpersonal skills. It is in the clinical environment and working with their

supervising technologists that provide the most influence in the development of a student's communication skills.

## CHAPTER 5: Discussion, Conclusion, Implications, and Recommendations

It has been previously suggested that strong attitudes are more likely to affect behavior (Holland et al., 2002). In healthcare, there is more of an emphasis on developing behaviors that enhance effective communication (Silverman, 2009). The patient-centered communication approach has been encouraged for many years as a way to foster a better relationship and improve the patient's experience (Stewart, 1995). While healthcare educational programs include communication as part of their curriculum, they are predominantly taught during students' didactic pre-clinical training (Suojanen et al., 2018). Despite this foundational knowledge, it has been shown that communication skills are best developed during clinical education by watching their instructors interact (Rosenbaum & Axelson, 2013). This concept is consistent with the theory of situated cognition, which posits that knowledge is a product of the activity, context, and culture where it is used (Brown et al., 1989). It has also been shown that the application of communication skills in clinics may not match those taught in the didactic setting, known as a hidden curriculum (Silverman, 2009). These concepts are well documented for physicians and nurses, but less studied for the radiologic technologist.

The purpose of this quantitative cross-sectional study was to investigate the impact clinical education has on radiology students' attitudes toward learning communication skills. This study also sought to explore the hidden curriculum concept in relation to the communication skills taught pre-clinically and those modeled in clinics. Data was acquired through the use of the communication skills attitude scale (CSAS) which was modified to be relevant to radiology along with additional open-ended questions. Convenience sampling methods were used to gather data from selected radiology programs in the United States. The use of convenience sampling limits this study from generalizing the results to the entire population of radiology students.

While generalizability is a limitation, the data from this study does provide a foundation for future research.

This chapter will provide a discussion of the results, recommendations for future research, and conclusions from this research. The knowledge gained from this study regarding radiology students' attitudes toward learning communication skills will be related to the existing literature and advance the research on this topic through the inclusion of radiologic technology.

**Research Question One**

The first research question investigated the impact clinical education has on students' attitudes toward learning communication skills. This research shows students' attitudes toward learning communication skills initially increase as they begin clinical training then decreases as they progress. These findings are consistent with previous research in other healthcare disciplines (Anvik et al., 2008; Usman & Siddiqui, 2018). However, these findings are contradictory to other studies that found attitude increases or returns to pre-clinical status as students progress (Morris, Donohoe, & Hennessy, 2013; Wright et al., 2009).

The findings of this study suggest radiology students in their initial exposure to the clinical setting are more receptive to learning communication skills. This can be explained based on the concept of legitimate peripheral participation, where students beginning their clinical education are on the periphery (Lave & Wenger, 1991). While on the periphery, they are observing the culture of radiology and the concepts of communication taught pre-clinically are retained. As students gain more clinical experience and become part of the culture, their attitude toward learning communication decrease. This is further established based on the findings which show a wider gap between the attitude more experienced students have in the Value seen in learning communication skills compared to their perceived importance of knowing these skills.

This suggests that while students realize communication skills are Important for the job, they do not see the value in learning them as they become more experienced. This might be a result of complacency toward the value communication skills bring as they gain more confidence and become more adept to the culture of the field. The concept of legitimate peripheral participation explains that when given time, the student progresses from the periphery to full participation within the culture (Lave & Wenger, 1991). The theory of situated cognition posits that culture, activity, and context influence learning (Brown et al., 1989). Therefore, these findings indicate that the decrease of attitude toward learning communication skills is found within the culture of radiology.

The correlation found between the value and importance of learning communication skills with those having more clinical experience is stronger than those with less experience. This suggests some important educational implications. If there is a reinforcement of communication principles given to the more experienced students on the practical importance of such skills, they might perceive the training as being more valuable and, therefore, more receptive to learning. The focus of further training should include those aspects that reinforce the value of learning communication skills which relate more to the patient's experience than the procedure.

**Research Question Two**

The second research question sought to assess selected demographics and attitude toward learning communication skills. Findings show those not admitted to a program have a higher attitude than those admitted regardless of the amount of clinical experience. This suggests that once a student is admitted to a program, their learning interests shift from pre-clinical communication subjects to other areas. This is reflective of the curriculum which also shifts away from theoretical communication skills taught pre-clinically to other subject matters

(Suojanen et al., 2018). In radiology, this shift is typically to the procedural aspect of the profession.

Female students were the majority of the sample which is consistent with the population of radiologic technologists in America (American Society of Radiologic Technologists wage survey, 2019). In this study, female students had a higher attitude toward learning communication skills. This is consistent with previous studies in other disciplines (Anvik et al., 2008; Cleland et al., 2005; Laurence et al., 2012; Wright et al., 2006). A previous study suggested female students may have a more positive attitude to all aspects of undergraduate teaching (Cleland et al., 2005). Additionally, it has been suggested that male students may be overconfident regarding their communication skills while females were more realistic (Wright et al., 2006). While these ideas are not a focus of this study, it is a consideration. The differences between males and females in this study were small; therefore, it is suggested that male and female radiology students may be more homogenous in their attitude toward learning communication skills. This would be reflective of the culture in radiology toward communication rather than the gender.

Students between the age of 30-33 had a higher attitude than the majority of the sample who were 18-25. These findings support previous studies that reported new graduates lack the communication skills for which employers are looking (Bauer-Wolf, 2018; Soule & Warrick, 2015). However, this study found students over the age of 35 had the lowest attitude, indicating the non-traditional student may not be receptive to undergraduate communication teaching. The small sample size of those over 35 (n=6) is a limitation that should be taken into consideration and warrants further study.

The most significant finding when analyzing race was that Asian students consistently scored the lowest for overall attitude as well as the perceived value and importance of learning communication skills. A previous study found Korean students were more skeptical regarding the necessity of learning communication skills in medical school (Ahn et al., 2009). This study did not determine the origin of the Asian student; however, findings support the previous study. Asian students in this study had the lowest mean score toward the perceived importance of learning communication skills. While caution should be taken about making generalizations about these findings, educational programs should be aware of the possible cultural differences.

Findings related to educational program, degree, and highest school completed are limited to sampling bias. The convenient sampling methods used in this study were biased toward the University programs which offer a bachelor's degree. A more representative sample of radiology programs at varying institutions would produce more accurate findings related to the highest level of education completed. Further research is needed to provide more accurate results on the differences between these variables.

Those with previous healthcare experience had a higher attitude toward learning communication skills. This supports a previous study that also found those with previous experience with health services had a higher positive attitude (Anvik et al., 2008). Those who have previous experience better understand the value and importance of proper communication skills needed in the healthcare field. This may be due to the previous healthcare culture the student experienced. By having pervious awareness on the significance communication skills have would provide a foundation when they begin their studies in radiology. This study did not ask to clarify the type of experience the students had. Doing so, might provide insight to the type of communication expectations and training they had.

Finally, assessing the attitude of students with previous military experience was included in this study. The rationale for including this independent variable comes from personal experience. I have observed and counseled students with prior military experience who struggle mastering an empathetic communication style. Results of this study show those with military experience have a lower attitude toward learning communication skills Military veterans are more likely to have skills related to planning and acting but lack emotions which negatively impacts their employment opportunities (Shepherd, Kay, & Gray, 2019). This may be related to the structured culture of the military to which the student has been exposed. To the best of my knowledge, there are no previous studies that asked about military experience using the CSAS. Emphasizing the value learning communication skills bring to the field will need to be a focus for educational institutions who have students with military experience. Educational programs will need to better explain the importance interpersonal skills, such as empathy, has in the civilian healthcare culture.

**Research Question Three**

Question three sought to identify if a gap exists in radiology communication training found in the classroom and those modeled in clinics. Based on the findings from this study, there is a partial disconnect between the communication theories taught in the classroom and those modeled in clinics. When asked what good behaviors for communication were, the majority of students responded with interpersonal communication behaviors, many of which were non-verbal. Behaviors such as empathy, eye-contact, and posture were given and are traits emphasized within the patient-centered communication. However, the behaviors most modeled were procedural and not related to the patient-centered communication model. The frequency of procedural communication styles of this study do support previous research which indicates

radiology is a "hit and run" profession and that obtaining the image is paramount over building a relationship with the patient or using interpersonal skills (Hadley & Watson, 2016; Reeves & Decker, 2012; Salazar et al., 2013). The procedural style of communication is an emphasis in radiology programs once the student is admitted. It is important for students to learn how to properly explain the examination and give instructions to obtain a diagnostic image. Based on these findings, students are less apt to see interpersonal behaviors in clinics, despite identifying those traits as important and taught pre-clinically.

Disturbingly, students also indicated they see rude and unethical behaviors being modeled in clinics. They see impatience on behalf of their supervising technologists which may be a result of the pressure to decrease wait times. Students feel unprepared to deal with difficult patients and other areas requiring critical thinking such as trauma. Communicating with other healthcare professionals are areas students indicate are not developed pre-clinically. These findings are concerning and provides an opportunity for curricular enhancements in educational programs to bolster these skills. Interprofessional collaboration and simulations are concepts radiology programs could consider to help reduce this skills gap.

Question three also asked what the greatest influence in the development of their communication behaviors was. Overwhelmingly, 70% of the students reported it was being in the clinical environment and their supervising technologists. This supports the situated cognition theory that learning cannot be separated from doing and through participation in authentic activities, abstract knowledge is transformed into practical (Artino, 2013; Brown et al., 1989). The principles found within cognitive apprenticeship are also supported. It is the methods of coaching and modeling that appear to have the greatest impact on the radiology student. The influence supervising technologists have is a potential area of concern because of the negative

behaviors that were reported. As a result, if there is to be any change in the communication styles of the radiology student, the culture of radiology would need to embrace the change.

**Conclusion**

Clinical education does impact radiology students' attitudes toward learning communication skills. As students progress in clinics, their attitude toward learning communication decreases. Providing additional training as students are in the later stages of clinics may improve their attitude. As a result, students may be reminded of the value and importance in learning communication skills, particularly with interpersonal skills, which can change the culture in clinics.

The clinical environment and technologists have the greatest influence on students' communication behaviors. The theoretical foundations taught pre-clinically declines as students enter the clinical environment. Much of the emphasis is focused on the procedure over the relational interpersonal skills, which is a departure from the patient-centered communication model. This shows the difference in skills technologists need compared to other healthcare professionals. However, based on the findings from this study which reported inappropriate behaviors being modeled in clinics provides one potential reason for the decrease in attitude toward learning communication.

This study further supports the theory of situated cognition and provides an opportunity for educational programs to develop training that revolves around the cognitive apprenticeship model. As students become technologists, they will create the culture of radiology communication. By using the data from this study, there are educational opportunities to intercede and positively change the students’ attitudes, which, in turn, will lead to positive behaviors.

**Implications for Educational Programs**

Implications of the findings in this study can impact educational programs. A curricular intervention should be introduced in the later stages of students' clinical education. This has been attempted in physician education programs with mixed results (Bombeke et al., 2011; Van Weel-Baumgarten et al., 2013). Due to the substantial significant positive relationship found in this study between the Value and Importance subscale, an emphasis should be placed on the significance communication skills provide to the field after the student completes 500 hours of clinical experience. This should include best communication practices that mirror the realities of clinics, such as using informal communication.

Unlike studies from other healthcare disciplines' attitude toward learning communication skills, there is little difference seen with gender as it relates to radiology students. However, educators should be aware of potential cultural differences and remain cognizant of prior military experience for pedagogical design.

A communication model that includes a combination of interpersonal skills with specific and guided procedural instructions is needed. Radiology educators should embrace the differences in the communication needs between radiology and other healthcare disciplines such as physicians and nurses. The mandates of the field still dictate that speed and quality of image is of utmost importance (Reeves & Decker, 2012). However, radiology cannot ignore the realities of healthcare which value interpersonal skills and communication just as important as diagnostic skills (Brimmer, 2014). This would necessitate a change from the patient-centered model by lessening joint decision making. It is in the patient's best interest to listen to the instructions of the technologist in order to obtain a high-quality diagnostic image. However, the technologist must avoid being bossy and autocratic (Booth & Manning, 2006).

To decrease the partial hidden curriculum found in this study, educational programs should collaborate with the technologists in clinics to raise awareness of the influence they have on students' communication development. This could be accomplished through on-site clinical instructor workshops, webinars, or distant education platforms.

**Implications for Technologists**

This study supports previous research in other healthcare disciplines that students learn communication skills from the role models they find in clinics (Rosembaum & Axelson, 2013). Technologists must be aware of the impact they have on what is considered normal practices for the profession. Negative communication habits will be viewed as acceptable which is detrimental to the field. The clinical environment provides experiences vital to the development of a student's communication habit which cannot be replicated in the controlled on-campus environment. While simulations and role play have shown to be effective, they cannot replace the actual clinical environment (Baile & Blatner, 2014; Bhana, 2014; Quail et al, 2016). Improvement to radiology students' attitude toward learning communication skills can only happen through a change to the radiology culture. As the theory of situated cognition posits, once culture changes so will activity and context which will then influence learning.

**Recommendations for Future Research**

This is a foundational study for future research in the area of communication for radiologic technologists. To the best of my knowledge, there is no other study that has looked at radiology students' attitudes toward learning communication skills. Future research with a larger sample to include parametric methods is needed to allow for generalizability of the population. A longitudinal study is suggested to determine the impact of clinical education on cohorts. This study was specific to the radiography student. Future research could include analyzing the

differences in communication styles between modalities such as MRI, CT, Sonography, Nuclear Medicine, or Radiation Therapy.

In order for radiologic technology to establish best practices related to communication, research specific to radiology is needed. With the minimal research currently available there is a reliance on other healthcare disciplines that require a different skill set. Radiologic technologists are involved in a variety of settings and communicate with a variety of people. It is not uncommon for a technologist to participate in surgical procedures, emergency room situations, pediatric examinations, and geriatric examinations in one day. Each of these would require a different communication style. One communication model developed from other disciplines do not reflect the best practices for a technologist. Future research would include different models based on the situation. Radiologic technology is a vital aspect of medicine and is deserving having research specific to its own culture.

## Appendix A: Survey Demographics

1. What is your age (18-21, 22-25, 26-29, 30-33, 34-37, 38+)
2. What is your gender (Male, Female, Prefer not to answer)
3. What is your race (Caucasian, African American, Latino, Asian, Pacific Islander, Native American, Prefer not to answer)
4. What type of educational program do you attend? (University, College, Community College, Proprietary, Hospital-Based, Other)
5. What type of degree will you obtain? (Baccalaureate, Associates, Certificate, Other)
6. What is the highest level of education you completed? (High School diploma, GED, Associates Degree, Baccalaureate, Graduate Degree, Other)
7. Do you have previous work experience in healthcare (Yes, No)?
8. Do you have previous military experience? (Yes, No)
9. How many hours of clinical education have you completed? (0, 1-500, 501+)

## Appendix B: Original Communication Skills Attitude Scale (CSAS)

Please read the following statements about communication skills learning. Indicate whether you agree or disagree with all of the statements by circling the most appropriate response. Remember, 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

| | | | | | |
|---|---|---|---|---|---|
| 1. In order to be a good doctor I must have good communication skills | 1 | 2 | 3 | 4 | 5 |
| 2. I can't see the point in learning communication skills | 1 | 2 | 3 | 4 | 5 |
| 3. Nobody is going to fail their medical degree for having poor communication skills | 1 | 2 | 3 | 4 | 5 |
| 4. Developing my communication skills is just as important as developing my knowledge of medicine | 1 | 2 | 3 | 4 | 5 |
| 5. Learning communication skills has helped or will help me respect Patients | 1 | 2 | 3 | 4 | 5 |
| 6. I haven't got time to learn communication skills | 1 | 2 | 3 | 4 | 5 |
| 7. Learning communication skills is interesting | 1 | 2 | 3 | 4 | 5 |
| 8. I can't be bothered to turn up to sessions on communication skills | 1 | 2 | 3 | 4 | 5 |
| 9. Learning communication skills has helped or will help facilitate my team-working skills | 1 | 2 | 3 | 4 | 5 |
| 10. Learning communication skills has improved my ability to communicate with patients | 1 | 2 | 3 | 4 | 5 |
| 11. Communication skills teaching states the obvious and then complicates it | 1 | 2 | 3 | 4 | 5 |
| 12. Learning communication skills is fun | 1 | 2 | 3 | 4 | 5 |
| 13. Learning communication skills is too easy | 1 | 2 | 3 | 4 | 5 |
| 14. Learning communication skills has helped or will help me respect my Colleagues | 1 | 2 | 3 | 4 | 5 |
| 15. I find it difficult to trust information about communication skills given to me by non-clinical lecturers | 1 | 2 | 3 | 4 | 5 |
| 16. Learning communication skills has helped or will help me recognize patients' rights regarding confidentiality and informed consent | 1 | 2 | 3 | 4 | 5 |
| 17. Communication skills teaching would have a better image if it sounded more like a science subject | 1 | 2 | 3 | 4 | 5 |
| 18. When applying for medicine, I thought it was a really good idea to learn communication skills | 1 | 2 | 3 | 4 | 5 |
| 19. I don't need good communication skills to be a doctor | 1 | 2 | 3 | 4 | 5 |
| 20. I find it hard to admit to having some problems with my communication skills | 1 | 2 | 3 | 4 | 5 |
| 21. I think it's really useful learning communication skills for a medical Degree | 1 | 2 | 3 | 4 | 5 |
| 22. My ability to pass exams will get me through medical school rather than my ability to communicate | 1 | 2 | 3 | 4 | 5 |
| 23. Learning communication skills is applicable to learning medicine | 1 | 2 | 3 | 4 | 5 |
| 24. I find it difficult to take communication skills learning seriously | 1 | 2 | 3 | 4 | 5 |
| 25. Learning communication skills is important because my ability to communicate is a lifelong skill | 1 | 2 | 3 | 4 | 5 |
| 26. Communication skills learning should be left to psychology students, not medical students | 1 | 2 | 3 | 4 | 5 |

## Appendix C: Permission to use CSAS from original author

Fine with me chad - good luck with your project!

**PROFESSOR CHARLOTTE REES** *PhD, FHEA, FRCP (Edin)*

**Director of Monash Centre for Scholarship in Health Education (MCSHE)**
**Director of Curriculum (Medicine)**
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On Wednesday, 19 December 2018, Chad Hensley <chad.hensley@unlv.edu> wrote:
Dr. Rees,

I am a doctorate student at the University of Nevada Las Vegas in the United States. I am writing to ask permission to use the Communication Skills Attitude Scale for my dissertation. I would like to use your survey on radiologic technologist students and assess the influence clinical education has on their attitude in learning communication skills.

Thank you for your consideration,

Chad Hensley

---

UNLV

**Chad Hensley, M.Ed. R.T.(R)(MR)**
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School of Allied Health Sciences - Radiography Program
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Office: 702-895-3811

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## Appendix D: Modified CSAS

Please read the following statements about communication skills learning.
Indicate whether you agree or disagree with all of the statements by circling
the most appropriate response.
Remember, 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree,

| | | | | |
|---|---|---|---|---|
| 1. In order to be a good radiologic technologist I must have good communication skills | 1 | 2 | 3 | 4 |
| 2. I can't see the point in learning communication skills | 1 | 2 | 3 | 4 |
| 3. Nobody is going to fail their radiology certification for having poor communication skills | 1 | 2 | 3 | 4 |
| 4. Developing my communication skills is just as important as developing my knowledge of radiology | 1 | 2 | 3 | 4 |
| 5. Learning communication skills has helped or will help me respect Patients | 1 | 2 | 3 | 4 |
| 6. I haven't got time to learn communication skills | 1 | 2 | 3 | 4 |
| 7. Learning communication skills is interesting | 1 | 2 | 3 | 4 |
| 8. I can't be bothered to turn up to sessions on communication skills | 1 | 2 | 3 | 4 |
| 9. Learning communication skills has helped or will help facilitate my team-working skills | 1 | 2 | 3 | 4 |
| 10. Learning communication skills has improved my ability to communicate with patients | 1 | 2 | 3 | 4 |
| 11. Communication skills teaching states the obvious and then complicates it | 1 | 2 | 3 | 4 |
| 12. Learning communication skills is fun | 1 | 2 | 3 | 4 |
| 13. Learning communication skills is too easy | 1 | 2 | 3 | 4 |
| 14. Learning communication skills has helped or will help me respect my colleagues | 1 | 2 | 3 | 4 |
| 15. I find it difficult to trust information about communication skills given to me by non-clinical lecturers | 1 | 2 | 3 | 4 |
| 16. Learning communication skills has helped or will help me recognize patients' rights regarding confidentiality and informed consent | 1 | 2 | 3 | 4 |
| 17. Communication skills teaching would have a better image if it sounded more like a science subject | 1 | 2 | 3 | 4 |
| 18. When applying for medicine, I thought it was a really good idea to learn communication skills | 1 | 2 | 3 | 4 |
| 19. I don't need good communication skills to be a radiologic technologist | 1 | 2 | 3 | 4 |
| 20. I find it hard to admit to having some problems with my communication skills | 1 | 2 | 3 | 4 |
| 21. I think it's really useful learning communication skills for radiology certification | 1 | 2 | 3 | 4 |
| 22. My ability to pass exams will get me through radiology school rather than my ability to communicate | 1 | 2 | 3 | 4 |
| 23. Learning communication skills is applicable to learning radiology | 1 | 2 | 3 | 4 |
| 24. I find it difficult to take communication skills learning seriously | 1 | 2 | 3 | 4 |
| 25. Learning communication skills is important because my ability to communicate is a lifelong skill | 1 | 2 | 3 | 4 |
| 26. Communication skills learning should be left to psychology students, not radiology students | 1 | 2 | 3 | 4 |

# Appendix E: IRB Approval

**UNLV Social/Behavioral IRB - Exempt Review**
**Exempt Notice**

| | |
|---|---|
| **DATE:** | April 22, 2019 |
| **TO:** | Howard Gordon, Ed.D |
| **FROM:** | Office of Research Integrity - Human Subjects |
| **PROTOCOL TITLE:** | [1419963-2] Radiology students' attitude toward learning communication skills: Impact of clinical education |
| **ACTION:** | DETERMINATION OF EXEMPT STATUS |
| **EXEMPT DATE:** | April 22, 2019 |
| **REVIEW CATEGORY:** | Exemption category # 2 |

Thank you for your submission of Revision materials for this protocol. This memorandum is notification that the protocol referenced above has been reviewed as indicated in Federal regulatory statutes 45CFR46.101(b) and deemed exempt.

We will retain a copy of this correspondence with our records.

**PLEASE NOTE:**

1. Prior to the start of the study, in your email script, please include the Principal Investigator (PI)'s name and contact information. You may start your study once this information has beeen added.

Upon final determination of exempt status, the research team is responsible for conducting the research as stated in the exempt application reviewed by the ORI - HS and/or the IRB which shall include using the most recently submitted Informed Consent/Assent Forms (Information Sheet) and recruitment materials.

If your project involves paying research participants, it is recommended to contact Carisa Shaffer, ORI Program Coordinator at (702) 895-2794 to ensure compliance with the Policy for Incentives for Human Research Subjects.

*Any* changes to the application may cause this protocol to require a different level of IRB review. Should any changes need to be made, please submit a **Modification Form**. When the above-referenced protocol has been completed, please submit a **Continuing Review/Progress Completion report** to notify ORI - HS of its closure.

If you have questions, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 702-895-2794. Please include your protocol title and IRBNet ID in all correspondence.

Office of Research Integrity - Human Subjects
4505 Maryland Parkway . Box 451047 . Las Vegas, Nevada 89154-1047
(702) 895-2794 . FAX: (702) 895-0805 . IRB@unlv.edu

# Appendix F: IRB Modified Approval

## UNLV Office of Research Integrity - Human Subjects (ORI-HS) - Administrative Review Acknowledgment Letter

| | |
|---|---|
| DATE: | July 11, 2019 |
| TO: | Howard Gordon, Ed.D |
| FROM: | UNLV Social/Behavioral IRB |
| PROJECT TITLE: | [1419963-3] Radiology students' attitude toward learning communication skills: Impact of clinical education |
| SUBMISSION TYPE: | Amendment/Modification |
| ACTION: | ACKNOWLEDGED |
| EFFECTIVE DATE: | July 11, 2019 |
| NEXT REPORT DUE: | April 21, 2022 |

Thank you for submitting the Amendment/Modification materials for this project. The UNLV ORI-HS has ACKNOWLEDGED your submission. No further action on submission 1419963-3 is required at this time. You may continue with the research as planned.

The following items are acknowledged in this submission:

- Amendment/Modification - Modification Request Form.6.11.19.doc (UPDATED: 06/11/2019)
    - Update to exemption application and survey including modification to the final question asking "*How many hours of clinical education have you completed?*" The answer needs to be modified to (0, 1-500, 501+hours).
- Proposal - CH.Exempt Research Form.6.11.19.pdf (UPDATED: 06/11/2019)
- Questionnaire/Survey - survey.modified.docx (UPDATED: 06/11/2019)

If you have any questions, please contact Office of Research Integrity - Human Subjects at (702) 895-2794 or IRB@unlv.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been issued in accordance with all applicable regulations.

## Appendix G: Email Invitation Letter

Greetings (Name of program director or instructor),

This e-mail contains the link to the survey I previously spoke to you about regarding radiology students' attitude toward learning communication skills based on their clinical experience. I would appreciate it if you could ask students in your introductory course without clinical experience, admitted students with less than 500 hours of clinical experience, and admitted students with more than 500 hours of clinical experience to participate. The survey is voluntary and should take approximately 15 minutes to complete. To access the survey please click on the link below:

(Link to the survey)

Thank you,

Dr. Howard Gordon Principle Investigator
Mr. Chad Hensley M.Ed. R.T.(R)(MR)
UNLV Doctoral Candidate

## Appendix H: PCA Rotated Pattern Matrix

| Question | Factor loading I | Factor loading II |
|---|---|---|
| 1.* In order to be a good radiologic technologist I must have good communication skills | .316* | -.170* |
| 2. I can't see the point in learning communication skills | .477 | .024 |
| 3. Nobody is going to fail their radiology certification for having poor communication skills | .156 | .446 |
| 4. Developing my communication skills is just as important as developing my knowledge of radiology | .517 | .126 |
| 5. Learning communication skills has helped or will help me respect patients | .684 | -.209 |
| 6. I haven't got time to learn communication skills | .274 | .485 |
| 7. Learning communication skills is interesting | .404 | .323 |
| 8. I can't be bothered to turn up to sessions on communication skills | .288 | .447 |
| 9. Learning communication skills has helped or will help facilitate my team-working skills | .521 | .123 |
| 10. Learning communication skills has improved my ability to communicate with patients | .590 | .029 |
| 11. Teaching communication skills states the obvious and then complicates it | -.048 | .650 |
| 12. Learning communication skills is fun | .440 | .288 |
| 13. Learning communication skills is too easy | -.148 | .414 |
| 14. Learning communication skills has helped or will help me respect my colleagues | .709 | -.023 |
| 15. I find it difficult to trust information about communication skills given to me by non-clinical lecturers | .045 | .500 |
| 16. Learning communication skills has helped or will help me recognize patients' rights regarding confidentiality and informed consent | .655 | -.056 |
| 17. Teaching communication skills would have a better image if it sounded more like a science subject | .005 | .550 |
| 18. When applying to a radiography program, I thought it was a really good idea to learn communication skills | .670 | .012 |
| 19. I don't need good communication skills to be a radiologic technologist | .627 | .037 |
| 20. *I find it hard to admit to having some problems with my communication skills | .176* | .322* |
| 21. I think it's really useful learning communication skills for radiology certification | .635 | .094 |
| 22. My ability to pass exams will get me through radiology school rather than my ability to communicate | -.017 | .546 |
| 23. Learning communication skills is applicable to learning radiology | .646 | .139 |
| 24. I find it difficult to take communication skills learning seriously | .154 | .639 |
| 25. Learning communication skills is important because my ability to communicate is a lifelong skill | .601 | .175 |
| 26. Communication skills learning should be left to psychology students, not radiology students | .443 | .264 |

*Note.* *Questions with loading factor <.4 and excluded. Extraction method: Principal component analysis

## Appendix I: CSAS-R

*Cronbach's alpha

1. I can't see the point in learning communication skills
2. Nobody is going to fail their radiology certification for having poor communication skills
3. Developing my communication skills is just as important as developing my knowledge of radiology
4. Learning communication skills has helped or will help me respect patients
5. I haven't got time to learn communication skills
6. Learning communication skills is interesting
7. I can't be bothered to turn up to sessions on communication skills
8. Learning communication skills has helped or will help facilitate my team-working skills
9. Learning communication skills has improved my ability to communicate with patients
10. Teaching communication skills states the obvious and then complicates it
11. Learning communication skills is fun
12. Learning communication skills is too easy
13. Learning communication skills has helped or will help me respect my colleagues
14. I find it difficult to trust information about communication skills given to me by non-clinical lecturers
15. Learning communication skills has helped or will help me recognize patients' rights regarding confidentiality and informed consent
16. Teaching communication skills would have a better image if it sounded more like a science subject
17. When applying to a radiography program, I thought it was a really good idea to learn communication skills
18. I don't need good communication skills to be a radiologic technologist
19. I think it's really useful learning communication skills for radiology certification
20. My ability to pass exams will get me through radiology school rather than my ability to communicate
21. Learning communication skills is applicable to learning radiology
22. I find it difficult to take communication skills learning seriously
23. Learning communication skills is important because my ability to communicate is a lifelong skill
24. Communication skills learning should be left to psychology students, not radiology students

*Note.* *Cronbach's alpha .89

## Appendix J: Value Subscale

| | *Cronbach's alpha |
|---|---|
| 1. Developing my communication skills is just as important as developing my knowledge of radiology | |
| 2. Learning communication skills has helped or will help me respect patients | |
| 3. Learning communication skills is interesting | |
| 4. Learning communication skills has help or will help facilitate my team-working skills | |
| 5. Learning communication skills has improved my ability to communicate with patients | |
| 6. Learning communication skills is fun | |
| 7. Learning communication skills has helped or will help me respect my colleagues | |
| 8. Learning communication skills has helped or will help me recognize patients' rights regarding confidentiality and informed consent | |
| 9. When applying to a radiography program, I thought it was a really good idea to learn communication skills | |
| 10. I think it's really useful learning communication skills for radiology certification | |
| 11. Learning communication skills is applicable to learning radiology | |
| 12. Learning communication skills is important because my ability to communicate is a lifelong skill | |
| 13. I can't see the point in learning communication skills | |
| 14. I don't need good communication skills to be a radiologic technologist | |
| 15. Communication skills should be left to Psychology students, not radiology students | |

*Note.* * Cronbach's alpha .88

## Appendix K: Importance Subscale

| | *Cronbach's alpha |
|---|---|
| 1. Nobody is going to fail their radiology certification for having poor communication skills | |
| 2. I haven't got the time to learn communication skills | |
| 3. I can't be bothered to turn up to sessions on communication skills | |
| 4. Teaching communication skills states the obvious and then complicates it | |
| 5. Learning communication skills is too easy | |
| 6. I find it difficult to trust information about communication skills given by non-clinical lecturers | |
| 7. Teaching communication skills would be better if it sounded more like a science subject | |
| 8. My ability to pass exams will get me through radiology school rather than my ability to communicate | |
| 9. I find it difficult to take communication skills learning seriously | |

*Note.* * Cronbach's alpha .72

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Williams, B., Brown, T., Mckenna, L., Palermo, C., Morgan, P., Nestel, D., . . . Wright, C. (2015). Student empathy levels across 12 medical and health professions: An interventional study. *Journal of Compassionate Health Care, 2*(1), Journal of Compassionate Health Care, 2015, Vol.2(1).

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Wright, K. B., Bylund, C., Ware, J., Parker, P., Query, J. L., & Baile, W. (2006). Medical student attitudes toward communication skills training and knowledge of appropriate provider-patient communication: A comparison of first-year and fourth-year medical students. *Medical Education Online*, *11*(1), 4594.

Wright, S., Wong, A., & Newill, C. (1997). The impact of role models on medical students. *Journal of General Internal Medicine*, *12*(1), 53-56.

Xie, J., Ding, S., Wang, C., & Liu, A. (2013). An evaluation of nursing students' communication ability during practical clinical training. *Nurse Education Today*, *33*(8), 823-82

Zhang, Y., Jiang, G., Sun, Y., Zhao, X., & Yu, X. (2018). Adaptation of the communication skills attitude scale (CSAS) to Surgical Residents in China. *Journal of Surgical Education*.

**Curriculum Vitae**

Chad Hensley Ph.D. R.T. (R)(MR)
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## Education

| | |
|---|---|
| Ph.D. Curriculum & Instruction | 2020 |
| University of Nevada Las Vegas | |
| M.Ed. Educational Leadership | 2003 |
| University of Nevada Las Vegas. | |
| B.S. Radiologic Technology | 1997 |
| University of Nevada Las Vegas. | |
| Radiography Certificate Program | 1996 |
| University of Nevada Las Vegas | |
| Associates in Arts | 1994 |
| Crafton Hills College | |

## Academic Positions

Program Director,

- University of Nevada Las Vegas Radiography Program 2019-

Clinical Coordinator,

- University of Nevada Las Vegas Radiography Program 2008-2019

Senior Lecturer,

University of Nevada Las Vegas Radiography Program 2017-

Lecturer,

- University of Nevada Las Vegas Radiography Program, 2004-2017

Part Time Instructor,

- University of Nevada Las Vegas Radiography Program 1999-2003.

## Professional Organization Activities

***American Registry of Radiologic Technology (ARRT)***

- Item Writer 2013 – 2015

***American Society of Radiologic Technology (ASRT)***

- Committee on Bylaws 2017-2018
- Committee on RT Advocacy 2012 - 2103
- Leadership Academy Attendee 2006 and 2007

***Association of Collegiate Educators in Radiologic Technology (ACERT)***

- Conference Management Team Member 2013- Present
- Chairman of the Board 2011-2013
- President 2009-2011
- President Elect 2008-2009
- Vice President 2007-2008
- Secretary/Treasurer 2006-2007

***Joint Review Committee on the Education of Radiologic Technology (JRCERT)***

- Executive Board Member – Secretary/Treasurer 2019-Present
- Board of Director 2018- Present
- Site visitor Team Chair 2014-2018
- Site Visitor Team Member 2006- 2014

***Lambda Nu National Honors Society***

- Board Member 2008-Present

***Nevada Society of Radiologic Technologists (NvSRT)***

- Legislative Committee Chair 2017-Present
- Chairman 2016-2017
- Nevada State Delegate 2015-2017
- President 2014-2016
- Co-Founder 2014

**Publications**

Bontrager, K., and Lampingnano, J. (2014). Pediatric Radiography (615-648) co-author with Schans, Bette. *Textbook of Radiographic Positioning and Related Anatomy*. (8th ed).St. Louis: Elsevier.

DuBose, Cheryl, Barymon, D., Vanderford, V., Hensley, C., Shaver, G.. Nov/Dec (2015). *Radiologic Science Students' Perception of Parental Involvement.* Radiologic Technology. 86(2), pg 132-143.

Hensley, Chad & Bush, Aimee. Jan/Feb (2003). *The Importance of the Laboratory Class.* Radiologic Technology. 74(3), pg. 239-240.

Lampignano, J., and Kendrick, L. (2017). Pediatric Radiography (615-648). *Textbook of Radiographic Positioning and Related Anatomy*. (9th ed). St. Louis: Elsevier.

**Textbook Reviewer**

Nguyen, J. (2019). *Legal and Ethical Issues for Health Professionals.* (4th ed). St Louis:Elsevier.

**Professional Achievements**

| | |
|---|---|
| ACERT Outstanding Educator | 2020 |
| School of Allied Health Sciences Distinguished Service Award | 2019 |
| ASRT Outstanding Individual Grassroots Advocacy Award | 2015 |
| Aunt Minnie. Most Effective Radiologic Technologist Educator | 2015 |
| Distinguished Teacher of the Year | 2011-2012 |

**Conference Speaking Presentations**

April 13, 2019 - "Beyond your Paycheck. Elevating the Profession"
*Nevada Society of Radiologic Technologists state conference*

April 22, 2017 – "Beyond your Paycheck. Elevating the Profession"
*Nevada Society of Radiologic Technologists state conference*

April 30, 2016 - "The Chest X-ray: Cardiovascular Edition"
*Nevada Society of Radiologic Technologists state conference*

March 31, 2016 – "Radiographic Signs of Child Abuse and the Technologist's Role"

*Oklahoma Society of Radiologic Technologists state Conference*

April 11, 2015 – "The Chest X-ray: Cardiovascular Edition"

*Arkansas Society of Radiologic Technologists state conference*

April 11, 2015 - "Radiographic Signs of Child Abuse and the Technologist's Role"

*Arkansas Society of Radiologic Technologists state conference*

February 7, 2015 – "Radiographic Signs of Child Abuse and the Technologist's Role"

*Nevada Society of Radiologic Technologists Conference*

March 1, 2013 – "Radiographic Signs of Child Abuse and the Technologist's Role"

*West Coast Educators Council Student-Educator Seminar*

February 25, 2011 – "Radiographic signs of child abuse and the Technologists role"

*ACERT National Conference*

February 7, 2008 – "Preventing Powerless PowerPoint"

*ACERT National Conference*

February 2007 – "Radiography and CT Pathology of the Chest"

*ACERT National Conference. Spoke along with Dr. George Pales*

February 2, 2006 – "Radiography Aerobics"

*ACERT National Conference*.

February 3, 2006 – "Radiography and CT Pathology of the Chest"

*ACERT National Conference. Spoke along with Dr. George Pales*.

**Professional Credentials**

Certified Magnetic Resonance Imaging 1998

- American Registry of Radiologic Technologists.

Certified Radiography 1997

- American Registry of Radiologic Technologist.