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Exploring Engagement and Persistence Through the Lens of Student Experiences in a Sonography Program

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By

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Dedication

I dedicate this dissertation to God, who has given me the inner strength, peace and hope to persevere, at times, against all odds. I also dedicate this dissertation to my mother Gwendoline Lawrence who finally at the age of 85, hung up a gloves and stopped working as a registered nurse. She taught me the importance of having a strong work ethic, to be tenaious and resilient despite challenges or obstacles in life. She also encouraged me to persevere and aspire to reach my goals and dreams. Thank you for your love, patience, and encouragement. I could not have persevered and completed this journey without your support. my dreams and endeavors throughout my life, put up.. Thank you mom.

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Abstract

The juxtaposition of the increased current and future demand for Diagnostic Medical Sonographers and high attrition rates in many sonography programs emphasizes the need for colleges to do more to educate and train sonography practitioners who are prepared to enter the healthcare workforce. Additionally, a gap exists in understanding student engagement and persistence in Sonography programs. By filling this gap, pertinent answers about student success or lack thereof in these Sonography programs can be addressed.

This basic qualitative study aims to explore student engagement and persistence through the prism of their experiences in AS (DMS) programs at four-year state colleges in Florida. This study was framed by Tinto's (1993) Model of Student Integration which states that for students to persist, they must be fully engaged in all systems of the institution.

Semi-structured interviews with eight participants enrolled in AS (DMS) programs at two, separate four-year state colleges yielded valuable insights into their various academic and social experiences in the program and how these experiences related to their engagement and persistence. Six themes emerged during the interviews. These included, 1) Faculty and student interactions during academic instruction and learning; 2) Student involvement in learning; 3) Challenging experiences and barriers to learning; 4) Social and learning engagement with peers in the classroom; 5) Clinical environment created by practitioners; 6) Clinical learning and image acquisition training and feedback.

Study findings indicated the following: Positive and supportive social interactions with faculty and fellow students are needed for student engagement and persistence. Student engagement and persistence are determined by the quality of the faculty's instruction. Effective assessment design and feedback are required for students to reflect on their learning and engagement in the program. Students must take ownership of their learning process to be successful. The central role of clinical affiliates is to further student learning and engagement.

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Chapter 1: Introduction

Student engagement in higher education institutions has received considerable attention from administrators, policymakers, and other stakeholders and has been extensively researched (Axelson & Flick, 2011), and found to be crucial to student success and graduation (Kuh, et al. 2006; Fredin, et al, 2015). However, a gap in the literature regarding student engagement and persistence in Associate of Science in Diagnostic Medical Sonography programs (AS (DMS) at two- and four-year state colleges exist. National Center for Education Statistics (2019) which indicates that many students who enter sonography programs across the U.S. are not completing the AS (DMS) programs, amplifies the need for research on student engagement and persistence in sonography programs. Coupled with this, employment trends in diagnostic medical sonography indicate that a current and future demand for diagnostic medical sonographers exists.

During the onset of the unprecedented novel COVID-19 pandemic in our nation and the world, healthcare practitioners, nurses, and other healthcare professionals were on the front lines indicates that working tirelessly to care for and save the lives of patients. Physicians, nurses, and other professional healthcare workers who either contracted the virus or who worked extensively for long hours needed relief, hence rallying cries and pleas for help from retired healthcare professionals resounded in many states (Boyle, 2021). The healthcare crisis shone the spotlight on the current and future need for healthcare professionals including Diagnostic Medical Sonographers in this nation. The Association of Schools Advancing Health Professions (ASAHP) (2018) has estimated that as much as 60 percent of the U.S. healthcare workforce who play an essential role in delivering health care and other services are classified as Allied Health.

Allied Health occupations are distinct from nurses and physicians and use science-based technologies and evidence-based practices to diagnose, evaluate, treat diseases, promote the prevention of disease and health, and support various health care systems in different settings, by applying administration and managerial expertise (ASAHP, 2018).

The Commission on Accreditation of Allied Health Education Programs (CAAHEP), (2021), defines Diagnostic Medical Sonography as an allied health profession with includes "General sonography, cardiac sonography, vascular technology, and various subspecialties" (p. 1). Diagnostic medical sonographers use medical ultrasound (high-frequency sound waves) to produce images on internal structures to gather sonographic (ultrasound) data. Data is produced when images that are "2D representations of 3D anatomical structures" are created (Clem, et al., 2010, p. 163). The data is utilized to assist physicians in diagnosing various conditions and diseases, including monitoring fetal development. Sonographers practice under the supervision of a physician responsible for interpreting procedures (CAAHEP, 2021; Bureau of Labor Statistics, 2019). Clem, et al. (2010) explained that sonography is more subjective and operator dependent as "it is an acquired skill that requires manual manipulation of the probe/transducer to produce the images, while at the same time operating the ultrasound machine" (p. 163).

Sonographers may be employed in hospitals, outpatient centers, clinics, physician offices, and industry (CAAHEP, 2019). The demand for "sonographers, including instructors, researchers, and administrators, continues to exceed the supply, with faster than average job growth anticipated" (CAAHEP, 2019, p. 1). Data from the Bureau of Labor Statistics (2019), show that approximately 74,320 sonographers were employed in the U.S. in 2019, however there were 130,770 jobs available to be filled in 2018. Additionally, the projected growth for Diagnostic Medical Sonographers employment between 2020-2030 by the Bureau of Labor Statistics (2021)

is 14%. This employment growth is faster than the average of all other occupations and will add about 1.9 million new jobs. This is corroborated by the Commission for Accreditation of Allied Health Education Programs (CAAHEP) (2021), that stated the demand for diagnostic medical "sonographers, including instructors, researchers, and administrators, continues to exceed the supply, with faster than average job growth anticipated" (p. 1). Additionally, the average median pay for diagnostic medical sonographers was $32.25 per hour, equating to $75, 380 per year in 2021 (Bureau of Labor Statistics, 2019).

With employment trends indicating an increased demand for sonographers, the onus rests on educational institutions to bolster current and future preparation of sonographers by educating and training qualified professionals to enter the workforce. The projected growth of Diagnostic Medical Sonographers in Florida is twenty-seven percent (2018–2028). The Florida Department of Economic Opportunity (2021) corroborates the findings of the Bureau of Labor Statistics (2021) and demonstrates the long- term trend in workforce by the following data: "The ratio of working-age adults (expanded from 25-64-year-olds) to retirees will continue to fall as baby-boomers age "Florida Today = 2.5:1; Florida in 2030 =2.0:1." This indicates that the number of workers will decrease. Younger workers will not be able to fully replace new retirees. A shortage of highly educated and skilled workers will become a normal phenomenon (The Florida Legislature Office of Economic and Demographic Research, 2020, p. 9).

Table 1 below provides an overview of Diagnostic Medical Sonography employment rate and salary data in the state of Florida (Bureau of Labor Statistics, 2021).

Table 1

Occupational Information and Outlook for Diagnostic Medical Sonography Professionals in the State of Florida (2021–2030)

State	**Occupation Code**	**Occupation Title**	**Level**	**Employment**	**Employment** Relative Standard Error of the Employment Estimate (RSE)
Florida	29-2032	Diagnostic Medical Sonographers	Detail	5,520	4.7%

Employment Per Thousand Jobs	**Location Quotient**	**Median Hourly wage**	**Mean Hourly Wage**	**Annual Mean Wage**	**Mean Wage** Relative Standard Error of the employment estimate (RSE)
0.65	1.23	$33.03	$32.70	$68, 010	1.6
Annual Percent Growth	**Annual openings**	**FLDOE Training Code**	**In EFI Targeted Industry?**	**Data Source**	
2.57	522	3	Yes	S	

U.S. Bureau of Labor Statistics (2020, May).

The education for Diagnostic Medical Sonography programs may occur in universities, community colleges, technical schools, and other institutions, however, most of the sonography education occurs in community colleges. Fulton (2020) explained that almost 50% of U.S. states allow bachelor's degrees in a diverse number of programs (including Diagnostic Medical Sonography) to be awarded at community colleges as a "strategy to meet workforce demands, increase access to educational and career advancement opportunities, address affordability, and raise attainment rates (p. 1)."

The Associates of Science in Diagnostic Medical Sonography (AS (DMS) includes didactic education, ultrasound imaging training during class lab to assist students in gaining proficiency in their scanning skills, and clinical rotations at healthcare affiliate institutions (Larese et al., 2012).

Approximately 81, two-year and four-year state colleges and 563 universities and private colleges and universities offer either the AS (DMS), or the BS (DMS) accredited and unaccredited programs. CAAHEP (2021) explains that Diagnostic Medical Sonography programs offered at accredited institutions are between one and four years depending on the objectives, design of the program, and degree or certificate awarded. Applicants to a one-year certificate program must have completed and be qualified in an allied health clinically related program. AS (DMS) programs at two-year and- four-year state colleges require applicants to have attained a high school diploma or certificate with credits in algebra, basic science, general physics and communication skills at the college level. BS (DMS) programs are offered at universities to individuals who have completed a two-year AS (DMS) program (Commission on Accreditation of Health Education Programs, 2021; American Registry for Diagnostic Medical Sonographers [ARDMS], 2021). Accreditation of sonography programs are awarded by the Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS) in conjunction with CAAHEP the only accreditation commission for all sonography programs in the U.S.

In the state of Florida where this study was conducted, only 11 out of the 12 state universities and 28 public and state colleges offer the AS (DMS) program. Three of those colleges also offer the BS (DMS) program.

Table 2 below provides the names of the public and private institutions in Florida that offer either AS (DMS) and/or BS (DMS) programs. In this study, we will only focus on AS (DMS) programs at two-year and four-year state colleges in Florida.

Table 2

Higher Education Diagnostic Medical Sonography Program Offerings in the State of Florida

Institution Name	Public/Private	Associates Degree in DMS in Semesters	Bachelor's Degree in DMS in Semesters
Adventist University	Private	AS = 6 semesters	BS=12 semesters Post AS = 6 semesters
American College for Medical Careers	Private	AS= 6 semesters	BS=12 semesters Post AS = 6 semesters
Broward College	Public	AS= 6 semesters	
Cambridge College of Healthcare and Technology	Private	AS= 6 semesters	
Eastern Florida State College	Public	AS= 6 semesters	
Florida Institute of Ultrasound Inc	Private	AS= 6 semesters	
Florida National University Main Campus	Private	AS= 6 semesters	
Gulf Coast State College	Public	AS= 6 semesters	
Hillsborough Community College	Public	AS= 6 semesters	
Keiser University-FT Lauderdale	Private	AS= 6 semesters	
Meridian College	Private	AS= 6 semesters	
Miami Dade College	Public	AS= 6 semesters	
Nova Southeastern University	Private	AS= 6 semesters	
Palm Beach State College	Public	AS= 6 semesters	BS=12 semesters Post AS = 6 semesters
Pensacola State College	Public	AS= 6 semesters	
Polk State College	Public	AS= 6 semesters	
Santa Fe College	Public	AS= 6 semesters	
Southeastern College - West Palm Beach	Private	AS= 6 semesters	
Southern Technical College	Private	AS= 6 semesters	
Tallahassee Community College	Public	0	
Ultrasound Medical Institute	Private	AS= 6 semesters	
Valencia College	Public	AS= 6 semesters	

National Center for Education Statistics, (2019).

Two-year and four-year state colleges in Florida that offer AS (DMS) programs utilize selective admissions to admit candidates who are most likely to succeed in the program (Crawford & Jervis, 2011). The National Center of Education Statistics [NCES] (2019) revealed that retention rates of students at AS (DMS) programs at two-year and four-year state colleges in Florida over the past three cohorts indicated a positive and upward trend for many colleges. There are however a few select colleges whose retention rates fell below the 77th percentile which is the retention benchmark by the Joint Review Committee of Diagnostic Medical Sonography (JRC-DMS) for programs seeking accreditation (CAAHEP, 2021). AS (DMS) programs with low retention rates must implement strategies to increase student engagement and persistence to increase retention.

Administrators and program directors at two-year and four-year state colleges whose AS (DMS) programs failed to reach that retention threshold have voiced concern about students leaving or failing out of programs. Intervention from college administrators and AS (DMS) directors and educators are required to improve student completion. In 2019, the Joint Review Committee on Education in Diagnostic Medical Sonography announced that the previous reporting of the retention threshold of 77% was revised to a retention threshold of 70% nationwide. This revised threshold could help boost the retention rates and accreditation of diagnostic medical sonography programs who seek to improve student persistence and graduation.

Academic rigor and expectations in AS (DMS) programs demand a commitment from students to be fully engaged in their academics and ultrasound practical training in the college classroom and laboratory, and during their clinical training at clinical affiliate healthcare institutions. In a research study titled "Connecting the Dots", researchers from the National Survey of Student Engagement (NSSE) (2009) findings suggested that "engagement has compensatory effects on first-year grades and persistence to the second year of college at the same institution".

In addition, engagement was found to modestly and positively affect the grades and persistence of underprepared first-year students from different racial and ethnic backgrounds, even after taking many key pre-college variables into account (Kuh et al., 2008, p. 3). Researchers from the Community College Survey of Student Engagement (CCSSE, 2009) analyzed large sets of data from multiple states to document the relationships between student engagement and success indicators (grades, accumulation of credit hours, persistence, and completion) at two-year public colleges. Results indicated that there was a substantially positive association between student engagement and outcomes for public colleges (McCleeney & Marti, 2006).

Tinto (1975) asserted that student characteristics and the college or program environment or culture which includes its faculty and staff, resources, structure, and organizational system can influence the progress and integration/involvement of students in a positive or negative way (Townsend & Delves, 2009).

In addition to the rigorous academic workload, students in the AS (DMS) program may experience additional stressors during the practical clinical component of the program when they transfer from the classroom to clinical affiliate sites. This occurs when students are expected to engage in an unfamiliar, dynamic clinical healthcare workforce environment (Li et al., 2011). The clinical component of the AS (DMS) curriculum is integral and beneficial as it complements the formal didactic and laboratory curriculum of the program and prepares students for the healthcare workforce. It also lends to a variety of enriching experiences which could enhance students' learning (Brown et al., 2010).

Students in the AS (DMS) programs may also experience challenges while attempting to engage in the social and cultural environment of the program, the college, and the clinical affiliate. Educational institutions and educators in our current academic landscape are faced with increasing

challenges of fulfilling the needs of changing student populations, as many students come from diverse backgrounds with different priorities and challenges (Manyanga et al., 2017). Ma & Baum (2016) asserted that a "large proportion of minority, first-generation, low-income, and adult students," are served by two-year public and state colleges (p. 5). These student populations are regarded as at-risk populations by many researchers (Chen, 2017; Goodwin et al., 2016). Thus, to effectively teach diverse students, educators require a complete understanding of the classroom environment and pedagogical skills to interact with and teach these students (Grant & Sleeter, 2010). Tinto (2006) suggested that institutions who are serious about the success of their students can change their current environments and conditions to benefit all students. It is therefore imperative that the gap in the student engagement and persistence research in sonography programs be addressed to explore best practices for enhanced student engagement and persistence to improve their success. Research results will better inform and enhance the understanding of college and sonography program administrators, educators, and other stakeholders about student engagement and persistence. This will enable them to identify the necessary interventions and strategies to implement and to develop well-defined policies to support and enhance student engagement and persistence in learning both within and outside of the classroom (Taylor & Parsons, 2011).

Conceptual Framework

Tinto's (1975/1993) Student Integration Model will frame this study which seeks to understand student engagement and persistence in an AS (DMS) program. Tinto (1993) posits that institutions consist of an academic and social system that influences student involvement. He saw a connection between the "academic and social systems of the institution, the individuals who shaped those systems, and student retention over the different periods of time" (Tinto, 2015, p. 2-

3). Additionally, he asserted that student involvement/engagement at college is the catalyst that influences their persistence at college. If students become involved in one, both, or neither of the two systems depending on how they are influenced, they will either persist or leave. Together with student involvement at college, other influences which may foster their goals and commitment to succeed include student characteristics, family, economic background, personal demographics, abilities, pre-college preparation, or motivation for attending college. The extent to which students are connected to the academic system (achievement and grades) and the social system by interacting with faculty and their cohort, will determine their decision to persist or withdraw from college. By developing close connections to faculty, members of the college, and their peers through meaningful academic or social activities, they will be motivated to persist. Tinto (2014) emphasized that students should be equally integrated into the social and academic environment of their institutions as an over-commitment towards one and not the other could create issues. When students have positive experiences on the college campus, they are more inclined to increase their involvement in the academic and /or social system, whereas negative experiences at college may decrease their desire to engage (Tinto, 1993).

When institutions provide programs that encourage interaction between faculty and students, students will be more encouraged to engage in the college society (Habley et al., 2012; Tinto, 2004).

Statement of the Problem

The National Center of Education Statistics [NCES] (2019) revealed that not all AS (DMS) programs in the U.S. are meeting the retention threshold of 77% at two-year and four-year state colleges as previously mandated by the Joint Review Committee on Education in Diagnostic Medical Sonography in 2019. This indicates that too many students are failing to persist by either

leaving or failing out of the programs. Coupled with this, when a student fails or drops out of a two-year AS (DMS) program, it results in a loss of a career for the student, prospective employee in the workforce, and a loss for the U.S. economy. This is problematic, as it is incumbent on two-year public colleges to educate and provide qualified professionals to fill needed job vacancies in their communities. All this amplifies the need for focused research to be conducted to better inform college administrators and faculty about policies, strategies and interventions that can be employed to effectively enhance student engagement and persistence in their AS (DMS) programs.

This qualitative study will therefore seek to address that gap in the literature regarding student engagement and persistence in AS (DMS) programs through the prism of student experiences.

Purpose of the Study

The purpose of this study is to explore student engagement and persistence in AS (DMS) programs through the lens of student experiences in program academics (didactics and ultrasound practical training in the classroom and lab), and clinical education at clinical affiliate institutions.

Research Questions

The following research questions will guide this study:

1. What are the experiences of sonography students with their faculty during their academic trajectories and do they foster engagement and persistence in the AS (DMS) program?
2. What are the experiences of sonography students with their cohort during social interactions in the classroom and Scan Lab, and does it foster engagement and persistence in the AS (DMS) program?

3. What are the experiences of sonography students during clinical education rotations at the clinical healthcare educational affiliates and does it foster engagement and persistence in the AS (DMS) program?

Reflexivity Statement

Parahoo (2006) described reflexivity as a process in the practice of self-reflection to examine the position of subjectivities (judgement influenced by personal feelings and opinions instead of external influences) during the research process. Researchers must be diligent about examining themselves and their values on a regular basis. The researcher's influence on the participants, and the relationship between them is crucial to reflexivity (Jootun, McGhee & Marland, 2009, p. 28).

My sonography experience encompasses nineteen years of employment in local hospitals and outpatient centers in Florida as a registered Diagnostic Medical Sonography. Additionally, I was employed as a locum tenens (substitute) sonographer with different health employment agencies and accepted assignments in California, North Carolina, South Carolina, Massachusetts, and Minnesota for over one year. Like many non-traditional, and minority students enrolled in a sonography program at a two-year public college, I had difficulty navigating the educational landscape after returning to college as a full-time student. Integrating into the academic, social, and cultural environment of the program and the college was daunting for the following reasons, First, I shared a classroom and laboratory activities with a much younger cohort and younger educators. Second, the rigorous and demanding didactic and clinical practicum curriculum at college, and clinical practice rotations was challenging and overwhelming, Third, balancing and managing time and tasks effectively between college, work, finances, and my personal life was stressful demanded diligence and effort.

While practicing as a sonographer at hospitals and outpatient centers, I interacted with both first-and second-year students who were enrolled in the AS (DMS) program at a local two-year public college in Florida. These students attended the affiliated clinical sites (hospitals and outpatient centers) to fulfil the clinical practical component of the curriculum in their AS (DMS) program. Typically, all sonographers or a designated sonographer mentor, employed at the clinical affiliate is responsible for mentoring and evaluating students during their rotations. I interacted with students who persevered, excelled, and graduated from the AS (DMS) program. However, a few students either failed or withdrew from the program in the first or second year of college due to low academic achievement, inadequate clinical imaging skills, financial difficulties, or life challenges, and at times because of a myriad of issues. This study will therefore be influenced by the voices of second-year students who are currently attending AS (DMS) programs in Florida. These students will discuss their perceptions about their academic and social integration experiences within the classroom, the college, and at the clinical affiliate, and how their decisions to persist in the program were impacted by these experiences.

Delimitations

This study will only focus on a small representative sample of students in their third- and fourth-semester who are working toward AS (DMS) program completion and graduation in Florida. The research study is limited to the AS (DMS) programs and does not include information about BS (DMS) programs at universities or AS (DMS) programs at private colleges or universities.

Significance of the Study

Findings in this study can be applied to AS (DMS) programs at other state colleges and universities, and other Allied Health and Nursing programs. It can also enhance the knowledge

and understanding of college and AS (DMS) administrators and educators about the significance of student social and academic involvement in all aspects of the AS (DMS) program curriculum as key to their persistence. Additionally, well-defined strategies and improved policies can be developed and implemented to enhance and support student engagement and persistence practices in two-year and four-year state colleges.

Study findings will address a gap in the literature on student academic and social engagement and persistence in AS (DMS) programs.

Definitions

The following definitions apply to this study.

Allied Health - Allied health "encompasses a broad group of health professions who use scientific principles and evidence-based practice for the diagnosis, evaluation and treatment of acute or chronic diseases, promote disease prevention and wellness for optimum health, and apply administration and management skills to support health care systems in a variety of settings" (Association of Schools Advancing Health Professions (ASAHP, 2018, p. 1).

Academic Integration - refers to students' commitment to the intellectual life of an institution and to fulfilling their academic goals while engaging with and being influenced by interactions with faculty and peers during their college attendance (Tinto, 1975)

The Commission on Accreditation of Allied Health Education Programs (CAAHEP**) –** is the largest accreditor of health sciences professions programs (CAAHEP, 2022).

Clinical Affiliate - An affiliate is an institution which has sufficient resources to provide wide ranging clinical education opportunities for students (CAAHEP, 2019)

Clinical Education Center - A clinical education center is a specific department or other designated division of a clinical affiliate having sufficient resources to provide students with educational opportunities (CAAHEP, 2019).

Diagnostic Medical Sonography (DMS) – Diagnostic sonography or (ultrasonography) is a ultrasound-based diagnostic tool which is used to image/visualize internal organs, muscles, blood vessels, tendons, and joints to evaluate for "pathology or lesions" (Carovac et al., 2011, p. 168).

Engagement - "the student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (Newmann et al., 1992, p. 12).

Integration – For the purpose of this study, integration is defined as the act of a student incorporating themselves into a college group or community of students (Tinto, 1993).

Joint Review Committee on Education in Diagnostic Medical Sonography – is a non-profit which exists to establish, maintain and promote quality standards for Diagnostic Medical Sonography educational programs (JRC-DMS, 2022).

Persistence – Being enrolled on a continual basis till degree completion at any institution (National Student Clearinghouse Research Center, 2015)

Retention – Student retention in higher education is defined as the continued enrollment of a student within the same higher institution in the fall terms of the first and second years (National Student Clearinghouse Research Center, 2016)

Selective Admission – The selective admissions process requires students to meet specific standards to apply to a particular program with limited spaces available. The selective admissions process is implemented to enable program directors and instructors to identify prospective candidates best suited to complete the program (Shaab, 2013, p. 29).

Social Integration – For the purpose of this study, social integration is defined as the act of a student becoming a part of or incorporating themselves in a group or community of students at college and participating in related activities in the group (Tinto, 1993).

Sonography/Ultrasound**-** "applies to all acoustic energywith a frequency above human hearing (20 000 hertz or 20 kilohertz) (Carovac et al., 2011, p. 168)

Student Engagement – Student engagement describes the "time and effort students devote to activities that are empirically linked to desired outcomes of college and what institutions do to induce students to participate in these activities" (Kuh, 2009, p. 683).

Traditional Students **-** are defined as students younger than 25 years of age who enter college to pursue a degree on a continuous full-time basis during the academic year after graduating from high school (McNeil et al.**,** 2016**).**

Non-Traditional Students **-** The National Center for Educational Statistics (2020) defines non-traditional students as adult students over the age of twenty-four. Age often alludes to adult students who balance their time and educational goals with the additional responsibilities of maintaining a job, taking care of dependents, and often experience other life circumstances which can interfere with the successful completion of their educational goals.

Chapter 2: Review of the Literature

Literature reviews are an integral part of a research study as "synthesizing evidence helps us to find out what we know and don't know about what works and what doesn't work" (Booth et al., 2012, p. 3). Tinto's (1975/1993) Student Integration/Retention Model will be used to frame the study. In addition, a comprehensive review of the literature is required to gain knowledge and an understanding of previous and current research on student engagement and persistence to guide and provide context for my study on student engagement and persistence in AS (DMS) programs.

Overview of Diagnostic Medical Sonography Education

This study will primarily focus on the Associate of Science Degree in diagnostic medical sonography AS (DMS) programs at four-year state colleges (previously two-year colleges).

Student Admissions

Students are selected into the program through selective admissions procedures. According to CAAHEP (2021), the "maximum enrollment of students should be commensurate with the volume and variety of sonographic procedure, equipment, and personnel available for educational purposes." Additionally, the number of students assigned to a specific clinical affiliate will be determined by the number of registered sonography staff available to train the students. Only one staff member must be assigned to one student at a time (p. 4).

Applicants to AS (DMS) programs must also exhibit skills typically required by sonography practitioners which include social sagaciousness, interpersonal skills, employ strategies for effective learning, have critical thinking skills, be innovative, and possess effective comprehension and communication skills. Additionally, student admission to the program must

also be determined by the number of clinical affiliates (health care institutions available to teach students), and the number of students which can be assigned to these affiliates "as determined by a student/clinical staff ratio cannot be not greater than one-to-one" (CAAHEP, 2018, p. 4). The curriculum includes didactic courses which include "physical sciences, applied biological sciences, patient care, clinical medicine, applications of ultrasound, instrumentation, related diagnostic procedures, imaging, and a well-structured competency-based clinical curriculum" (CAAHEP, 2018, p. 1).

Despite selective admissions processes used in the AS (DMS) program, the ability for institutional administrators and educators to predict student success has been challenging (Miele, 2015). Students in two-year and four-year state colleges who offer Diagnostic Medical Sonography along with other Allied Health programs often face factors which may put them at risk for attrition. These factors include being academically underprepared for college, first-generation or minority students, or students from low economic backgrounds. Additionally, prior to applying to and entering a sonography program, students must complete a specified number of college prerequisites. This may lead people to believe that sonography students are prepared to deal with the rigorous program demands, but it may not always be the case (Miele, 2015).

Sonography programs use classroom didactic instruction to teach cognitive skills where information is imparted to students after which learning is applied through a practical scan lab simulated environment which allow students to observe and practice psychomotor skills. During scan lab, students learn how to develop autonomous psychomotor skills (fine motor skills such as eye-hand coordination, ambidexterity, manipulation, strength, and speed, etc.) combined with theoretical and physics knowledge such as recognizing patterns and interpreting images (Thoirs & Coffee, 2012).

The AS (DMS) program has a "steep learning curve" forcing students to work hard at becoming "skilled at combining anatomy recognition, hand-eye coordination, and probe dexterity" (Sim & Choirs, 2017, p. 1). Educators direct a considerable amount of attention in helping their students become proficient and competent in the minimum acceptable level of ultrasound imaging and preparing students to be successful in sonography registry examinations (Sim & Choirs, 2017).

In the imaging laboratory at college, hands-on ultrasound skills training by the instructor, provides students with the opportunity to interact and perfect their clinical ultrasound scanning skills with fellow students in a semi-structured educational environment (The sonography scan lab on campus mimiks a simulated hospital setting, using similar medical equipment like computers, gurneys, ultrasound machines, and various transducers (probes) with which to scan various ultrasound exams. It also contains ancillary equipment and products like sheets, towels, ultrasound gel, gloves, and a sink for practicing the universal health precaution of handwashing after imaging each simulated patient.

Clinical Education Student Rotations to Clinical Affiliate Institutions

Sonography students must complete a required number of clinical rotations (visits to clinical affiliates/educational centers) before they are able to graduate. Sonography programs are required to provide students "with a variety of care settings in which sonographic and /or other diagnostic vascular procedures are performed on inpatients and outpatients. An example of these settings includes Ambulatory care facilities, Emergence/trauma, Intensive/critical/coronary care, Surgery, Angiography/cardiac catheterization" (CAAHEP, 2021, p. 7). Each clinical affiliate education center should perform approximately 1500 completed sonographic examinations on patients, including permanent patient records and reports annually, per patient equivalent.

Each general learning concentration affiliate or clinical education center should perform approximately 1500 completed patient examinations, including production of permanent records and reports, per year, per student equivalent. The overall volume of procedures in which students participate in throughout the program should include a minimum of 30% ob/gyn procedures and a minimum of 30% abdominal procedures.

Students must have access to a variety of diagnostic medical sonography exams to become clinically competent in identifying normal and abnormal findings for different learning concentrations provided by clinical affiliates. Learning concentrations may include general sonography, Obstetrics and Gynecology, Vascular, Echocardiography, and others (CAAHEP, 2021, p. 4).

For the sonography student, clinical education at affiliate institutions is a crucial component of their curriculum and educational experience. A well-planned clinical education for students allows them to apply didactic sonographic theoretical concepts to the real-life clinical scenarios and situations. Additionally, clinical education promotes clinical skills and knowledge, teamwork and interpersonal skills, professionalism through behaviors and attitudes, and enhances their ability make sound judgements and decision-making in preparation for a successful career in the healthcare workforce.

Prior to student clinical placements at education affiliates, program administrators (program directors and clinical coordinators) must ensure that "Clinical affiliate agreements, articulation agreements, or memorandum of understanding (MOU) must be obtained by the hospital administrator and health sciences director at all clinical sites used for student placements. These contracts should be current and include termination clauses and termination language with signatories of institution/program officials and the clinical institution. Additional clinical affiliates

from accredited programs may only be submitted with the annual report, self-study, or findings response and must include the current JRC-DMS clinical affiliate spreadsheet, signed affiliation agreement, and verification of clinical instructor credentials (JRC-DMS/ CAAHEP (2020, p. 18-19).

Sonography programs are required to provide students "with a variety of care settings in which sonographic and /or other diagnostic vascular procedures are performed on inpatients and outpatients. An example of these settings includes Ambulatory Care facilities, Emergence/trauma, intensive/critical/coronary care, Surgery, Angiography/cardiac catheterization" (CAAHEP, 2021, p. 7). Students can enhance their sonography competencies (skills) by applying their ultrasound knowledge and scanning skills and techniques they learned during didactics and scan lab in class. Billett (2009) proposed that allied health clinical supervisors should encourage active and purposeful engagement with professionals in the clinical workplace setting by giving students tasks that will facilitate engagement. Student success at clinical affiliate sites will depend on being exposed to an extensive range of ultrasound equipment, various healthcare and ultrasound related scenarios, and regular interaction with practitioners in various scenarios with patients. Their success is also largely determined by effective clinical education by clinical instructors who are competent, have good teaching skills, excellent interpersonal skills, offer prompt, constructive feedback, and are good respectful role models.

By working alongside and engaging with clinical instructors, practitioners and other professionals in a healthcare, patient-focused environment, students can apply concepts learned in class and improve their performance by increasing their clinical experience. By enhancing their skills learned in class in real-world scenarios, students also benefit from workplace readiness training. Allied health students (including students enrolled in AS (DMS) programs) should be

provided with various learning experiences at the clinical workplace affiliate. This may include shadowing senior clinicians while they work, participating in discussions of patient cases, assessing patients, engaging with patients, peers, and other professionals. Clinical supervisors must also design, create opportunities, and keep track of clinical placement assignments and activities that prepare students for that workplace by developing skills which include coping with stress in the workplace, and the ability to work independently (Billett, 2009).

Accreditation of AS (DMS) Programs at Two-Year and Four-Year State Colleges in Florida

The Associate of Science Degree in Diagnostic Medical Sonography AS (DMS) programs at two-year and four-year state colleges are accredited by CAAHEP. CAAHEP defines accreditation as "an effort to assess the quality of institutions, programs, and services, by measuring them against accepted quality standards" (p.1). Institutional (college) and Programmatic (specialized) accreditation, are two types of accreditations assessed by CAAHEP. Institutional Accreditation indicates that a college meets the minimum standards for administration, resources, faculty and facilities. Programmatic Accreditation examines specific colleges or programs within an education institution. Programs are measured by standards which are generally developed by professionals involved in each discipline that intend to reflect the knowledge base and functions that individuals need to possess to successfully function in that specific profession. In health-related disciplines, certification and licensure along with accreditation intends to help assure that individuals in the workforce providing health-care services are well-prepared and qualified (CAAHEP, 2020). The program Director must be a credentialed sonographer and or /vascular technologist, must have acquired two years full-time clinical experience or the equivalent as a diagnostic medical sonographer or cardiac sonographer or

vascular technologist. The director must possess an academic degree (minimum of a baccalaureate degree), or educational equivalent and a minimum of two years of experience as an instructor. Faculty and educational staff must have individual educational qualifications and experience, be effective instructors in the subjects they are tasked to instruct by being knowledgeable in the subject matter and possess the appropriate credential/s for the learning concentration they are instructing and evaluating (CAAHEP, 2021).

The Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS) is a non-profit organization that was established in 1983 to maintain and promote quality standards for educational programs in Diagnostic Medical Sonography (DMS). The organization provides committee review to recognize educational programs throughout the U.S. that instructs students in diagnostic medical sonography disciplines through education consistent with standards required to enter practice (JRC-DMS, 2020).

Conceptual and Theoretical Issues on Persistence and Engagement

Academic Engagement

Kuh (2009) defined engagement as the "time and effort students devote to activities that are empirically linked to desired outcomes of college and what institutions do to induce students to participate in these activities (p. 683). Austin (1999) argued that student involvement is "the amount of physical and psychological energy the student devotes to the academic experience" (Austin, 1999, p. 36).

The character and culture of an institution affects a student's inclination to engage in academic and social activities in a direct or indirect way (Axelson & Flick, 2011; Braxton et al., 1995). Newmann et al. (1992) defined engagement as "the student's psychological investment in

and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" (p. 12).

Researchers from the Community College Survey of Student Engagement (CCSSE) who documented relationships between student engagement and success indicators at community colleges determined that student engagement and outcomes were significantly associated in a positive way (McCleeney & Marti, 2006). In addition, McCormick et al. (2013), proposed that student engagement profoundly influences student success as indicated in a study by the National Survey of Student Engagement (NSSE). Furthermore, Tinto (1975) asserted that student characteristics, the college or program environment or culture which includes its faculty and staff, resources, or structure and organizational system, can influence the progress and integration of students in a positive or negative way (cited by Townsend & Wilson, 2009).

Social Engagement

Student social engagement is imperative especially as it relates to their cohort, peers, and other members at college (Jach et al., 2016; Tinto, 1975). In his expanded model of student departure, Tinto (1993) proposed that the more integrated students are to the academic and social environment of the college, the more committed they are to the institution and their goal to persist until graduation (Pascarella et al., 1985). Thus, when students become connected to college academics, academic integration occurs, whereas, if students develop relationships and social connections outside of the classroom, social integration occurs. Students who are more integrated into the formal and informal life of the college tend to have a higher persistence rate than their counterparts who avoid college activities. The integration process can be impeded by isolation and incongruence (incompatibility), which could result in a lack of persistence (Tinto, 1993). Additionally, research revealed that if students remain committed to the institution at the end of

the first year, they will most likely continue to persist (Bean,1983; Tinto, 1993), and when students learn with other students in the classroom, they apply increased effort, experience enhanced learning and hence success (Brophy, 2002; Tinto, 1997).

Collaborative learning, which is a feature of social constructivism, recognizes that learning is a social activity where students learn from and with one another by discussing their views and perspectives and by building on each other's knowledge. By doing this, students will be exposed to different perspectives that will expand and increase their knowledge (Brophy, 2002; Woolley et al., 2015).

The Center for Immigration Studies reported that over 12% of undergraduate students in 2010 were comprised of immigrant students (Kim, 2009). A paucity of research on this demographic, and literature related to the challenges faced by documented and undocumented immigrant students and their postsecondary education experiences is still emerging (Oritz & Hinojosa, 2010). In their study of immigrant college students' academic obstacles, Soria and Stebleton (2013) found that many immigrant students may be first generation students who live with their families and commute to college. These students may have difficulty completing academic work or studies at home due to family responsibilities or distractions (Vuong et al., 2010). They may therefore lack time to engage in co-curricular college social engagement activities. Immigrant students may also be unaware of college resources available to them, including weekend and evening study hours and other resources which may enhance academic and social integration. Positive classroom activities, and students who are actively involved with faculty, peers, and other college members are more likely to persist till completion.

Oatey et al. (2014) asserted that activities that encourage intercultural connections must also relate to the policy of the institution which must possess a culture of inclusion and one that

genuinely values cultural diversity. These activities must be evaluated to see if they are feasible or not.

Student Connectedness Enhances Engagement

Students are also more likely to engage in college life and persist if they feel a sense of belonging. Strayhorn (2012) suggested that "a sense of belonging refers to a student's perceived social support on campus, a feeling or sensation of connectedness, the experience of feeling significant, accepted, respected, and valued by the group (campus community) or others on campus (faculty, peers). It is a cognitive evaluation that typically leads to an effective response or behavior" (p. 3). Additionally, students who have a sense of belonging feel emotionally connected to the college environment and individuals within the college. This in turn could enhance their motivation to engage in academic and social activities which could be a catalyst to their success (Hausmann et al., 2007). It is therefore imperative that students perceive themselves as part of the college community, such as faculty, staff, and their cohort, who value their engagement, and significance (Stebleton et al., 2014; Strayhorn, 2008; 2012; Tovar, 2013). Conversely, if students lack that sense of belonging, they may disengage from people and activities at college, and lose the motivation to persist (Tinto, 2017; Walton & Cohen, 2007). In other words, students who fail to sufficiently engage with others at college and if they have different goals and values to those at college are more likely to leave (Tinto, 1993).

The Role of Faculty in Student Engagement

Creating a Positive and Supportive Classroom Environment to Enhance Engagement

The college classroom is regarded as the hub of educational activities in the organizational structure of two-year and four-year state colleges. Both positive and negative experiences within the classroom become the prominent focus of students' academic experiences (Tinto, 1997). The

more engaged students are in the college environment, especially in their academics, the more knowledge and pertinent skills they acquire and develop (Endo & Harpe, 1982; Korobova & Starobin, 2015). Additionally, Gonzalez (2009) explained that results obtained from student focus groups indicated that many students who decided to remain in college did so because of a positive relationship they had with an instructor or staff member. Even students who persist and excel in their studies report that being more engaged with faculty and their cohort, enable them to experience higher academic achievement whilst at college (Endo & Harpe, 1982; Korobova & Starobin, 2015). This sentiment is echoed by Frisby & Martin (2010), who agreed that the overall climate in the classroom, whether positive or negative, is based on the relationships between students and their instructors (p. 147). If the relationship between student and educator is satisfactory, other aspects of the academic relationship will thrive thus increasing a student's sense of being a part of or belonging to the group and institution (Zumbrunn et al., 2014).

Faculty Support and Motivation to Encourage Engagement

Research shows that students who are motivated to learn will experience increased satisfaction during their college learning experience (Walker et al., 2016). They will be motivated to learn by having meaningful interactions with faculty and their peers, will be more engaged in their learning and will be more determined to persist.

Kezar and Maxey (2014) suggested that faculty will demonstrate a caring attitude by respecting students, providing them with individualized attention, and encouraging their participation in the classroom. However, together with motivating students and providing a caring attitude, faculty are also tasked with having complete mastery and seamless delivery of course content (Anderson & Anderson, 1982; Khalil, 2016). If lectures are performed in an enthusiastic,

interesting, and engaging manner, students will not only have a positive attitude toward their learning but feel motivated to engage in classroom activities.

Faculty Immediacy

Another concept that has been widely researched over 20 years is that of teacher immediacy. The concept of immediacy was first introduced and defined "as the extent to which communication behaviors enhance closeness to and nonverbal interaction with one another" (Mehrabian, 1969, p. 203). Additionally, Mehrabian (1969) suggested that nonverbal immediacy behaviors could be more impactful than verbal immediacy. In other words, actions speak louder than words. Teachers who are considered as being highly immediate make eye contact with students, move around, gesticulate, use various vocal sounds and humor, and provide examples that are personal. On the other hand, teachers who are regarded as being non-immediate do not make eye contact, may read from notes, may stand behind a podium instead of moving around, use few gestures, humor, and unrelatable examples (Anderson, 1986; Mandel, 2014). LeFebre and Allen (2014) suggested that the format of instruction either as a lecture/laboratory setting, or in an instructional classroom setting should have an influence on how instructors' immediate behaviors are perceived.

The instructor/student relationship may also have more relevance to students who enjoy a more relaxed and informal positive interaction with their instructor/s (Frisby & Martin, 2010; Parcarella & Terenzini, 1997). Students experiencing increased anxiety in certain circumstances, will regard support and motivation from their instructor invaluable, especially if they do not have anyone else to rely on (Micari & Pazos, 2012; Robbins et al., 2004; Pascarella & Terenzini, 1991). Additionally, several factors such as individual student differences, the educator/s culture and student classroom experiences, participation in peer culture, and institutional size, influences how

well students' informal contact is with educators outside of the classroom (Pascarella, 1980; Tinto, 1997). Coupled with this, Elmgren and Henriksson (2014) asserted that factors such as culture and diversity must be considered to improve academic skills and enhance education outcomes.

With the mandated clinical requirement of 50 lecture hours and 90 laboratory hours required to obtain 65 credit hours to graduate in AS (DMS) programs in Florida, instructors are responsible for providing didactic (educational) content, student evaluations, progress reports, reviewing, updating course material, and assisting students in clinical practice laboratories (labs) at college (CAAHEP, 2015). Instructors and students who spend a large amount of time together must be positively engaged and have a good report. It is therefore imperative that instructors motivate, support, and assist all students, especially those who experience anxiety, stress, or other program challenges. These challenges can result from academic rigor, clinical imaging practice, or social interactions with others in the program and college system.

Interventions that Could be Implemented to Enhance Student Engagement in the Academic and Social Environment of the AS (DMS) Program

Colleges throughout the country are recognizing the need to address the challenge of decreased student persistence, success, and college completion. Tinto (2013) asserted that current research on higher education student persistence and retention must change in the following ways: First, institutions must gain an understanding about the experiences of students from different backgrounds and recognize the complexities of student engagement; Second, researchers must develop an appreciation and understanding of how student culture, society, and type of institutions impact engagement. This, it is imperative to gain a perspective of the lens through which "different institutional settings such as residential, non-residential, two-year and four-year colleges view

student retention" (p. 3). They must also recognize the importance and value of student engagement in the classroom.

Providing a Culture of Support and Inclusivity

Institutions must ensure that students feel welcomed and supported, and hence perceive the institutional culture as being one of inclusivity. Institutions on the other hand must challenge current student labels which regard certain student populations as being at-risk, or more likely than others not to succeed, instead, they have to offer support to those students (Yeager & Walton, 2011). As previously mentioned, community colleges serve a large proportion of minority, first-generation, low-income, and adult students" (Ma & Baum, 2016. p. 5). These student populations are regarded as at-risk populations by many researchers (Chen, 2017; Falcon, 2015; Goodwin et al., 2016). Tinto (1993) asserted that students who develop a sense of belonging during interactions with faculty, peers, and others at college increase their engagement and persistence. When students feel unwelcome, disrespected or fearful, learning is diminished. Conversely, when the classroom environment and culture is positive, inclusive, and appealing, student learning can be enhanced (Murphy & Zirkel, 2015).

Student Persistence and Retention Measures

It is imperative that a thorough knowledge and understanding of the terms persistence and retention exist prior to analyzing the phenomena. However, this is challenging as the terms student persistence and student retention are often conflated when defined or described in the literature (Tinto, 2012a). For instance, Habley et al., 2012, describes student persistence as an individual behavior of someone who decisively, defiantly, and tenaciously continues with a task despite deterrents, impediments, or caution. Other Scholars define student persistence as the capability of an individual to achieve success in their academic pursuits (Roland et al., 2015; Ischler & Upcraft,

2014; Burrus, et al., 2013). The National Clearinghouse Research Center (2018) defines student persistence as the continued student enrollment toward degree completion at higher education institutions, despite initial enrollment at a different institution. Academic persistence on the other hand, is often defined as a multifaceted phenomenon influenced by the complex interaction of people, environmental factors, and academics (Tinto, 1974). It is evident that the above definitions identify persistence as student behaviors in different contexts. These include, student behavior influenced by individual attributes, behaviors related to their motivation to achieve academic success, and their individual behaviors related to the organizational environment and performance.

Teacher immediacy is charactierized by the behaviors used by instructors that create a psychological closeness between instructors and students (Christophel, 1990).

Retention, when defined as an organizational phenomenon, is typically determined and measured by the number of students who return and persist until graduation. Strategies implemented to enhance retention are determined by specific academic institutions and are typically measured by student demographics and reveal an institution's commitment to student success (Tinto, 1993). The National Student Research Center defines student retention as a student's continual enrollment from the first year to the second year at the same institution (Cotton et al., 2017; Farrell, 2009, Tinto, 1975, 1993). These terms are often inconsistently defined and the common denominator between them is student retention.

It is important for researchers to adequately define student persistence and retention and to quantify and operationalize it through specific measures so that its outcomes can be identified (Howard & Crane, 2019; Soldner et al., 2016). Student retention is contingent on the ability higher education institutions to satisfy the needs and expectations of their students (Schreiner & Nelson, 2013). Scholars have realized that a strong correlation exists between factors related to student

persistence, strategies implemented by institutions to enhance student persistence and retention, and student persistence in general. Institutions can evaluate student persistence in the following ways: Observing student-faculty engagement during instruction and social interactions in the class and college to determine how student attributes influence how they engage; gauge student perceptions of the college system to determine if students are content with services provided which may contribute toward their goals and commitments, and; assess students' educational experiences to determine if they are effectively engaged in their academics in ways in which their attributes are shaping and influencing their persistence and retention (Moore, 2008; Tinto, 1975, 1993). All this can be accomplished by providing students with surveys to complete about their impressions of the pedagogical methods of their faculty, classroom and laboratory equipment and learning aids. Suggestion boxes can be provided for students online and physically in various areas of the college building to elicit suggestions from students to improve, change, or enhance college services provided to them.

For the purpose of this study persistence refers to the continued enrollment of students in the AS (DMS) program from the last semester of the first year untill the completion of the program in the second year. Additionally, persistence also includes students who may have failed one course in any semester of the program or discontinued the program due to an unforeseen life event but returned to either retake the course and pass or return to continue in the program until completion.

Tinto's (1975/1993) Student Integration Model

Tinto's (1975/1993) longitudinal Model of Student Retention frames this study which explores student engagement and persistence as reflected in their experiences in AS (DMS) programs. He included that students' institutional experiences and their engagement in the college

academic and social systems determines their persistence and goals and commitments to the institution. For instance, Tinto (1997) asserted that student contact with faculty both inside and outside of the classroom influences student engagement, learning and persistence. However, the actions of faculty, which include student perceptions of their overall teaching skills, shape the classroom environment.

Tinto, (2012) proposed that effective strategies should be employed by institutions and incorporate it into the functioning of programs to enhance student persistence and success. These include, incorporating on-going formative and summative assessment into academic programs and the institutional environment "fabric of the institution", and share the assessment data with administrators, faculty, and other pertinent stakeholders (p. 6). Institutions must also provide support to students or certain groups of students who may feel isolated in a setting where they are underrepresented (Attinasi, 1989; Smith, 2018; Terenzini, et al, 1994).

When students identified as being 'at-risk' of academic failure or encounter challenges with the social demands of the college environment, they should receive timely support by their institutions to help them overcome their challenges to persist until completion. For such support to be effective it must occur before students lose their motivation to persist. It is therefore imperative that institutions alert faculty and other staff members promptly when they identify students at risk of dropping out or failing, so that early support systems can be provided to students who are experiencing challenges at college. Tinto (2017) found that too few institutions will commit the resources needed to address in-depth institutional issues that affect student retention.

In his model, he suggested that when students become connected to the college intellectually, academic integration/connection occurs and when students become socially connected, they create friendships and engage with others outside of the classroom.

In a study on the exploration of Tinto's framework for Community Colleges by Karp et al. (2008), they asserted that Tinto's integration model cannot fully be applied to community college because many students do not have time to integrate/ become involved socially. This because many two-and four-year state college students who commute to college do not experience much social involvement outside of the classroom. They tend to socially interact with faculty and peers in the classroom instead of the broad college environment. Student participation in information networks is an effective method of encouraging campus social involvement. Students typically participate in information networks which include faculty or fellow students with whom they believe they can gather information because they have a strong enough bond.

Tinto's (1975) initial Model of Student Retention has evolved over time and now include an enhanced understanding of experiences of students of different backgrounds and other influences such as culture, society, and academic institutions, and how they shape student retention. Additionally, an understanding of how students are retained in different institutional settings which includes residential, non-residential, two-year, and four-years institutions were necessary. For instance, by studying persistence in non-residential settings, the importance of the involvement of students in the classroom was recognized and appreciated,whereas prior to the study, it was not appreciated.

In AS (DMS) programs primarily offered at two-year and four-year state colleges, students regard the classroom and clinical education affiliate as the hub of educational activities. Many students commute to college, have full-time or part-time employment, take care of dependents, and have other responsibilities while attending class and clinical education at clinical affiliate sites. They lack the time to participate in any college-related social activities. Instructors are regarded as arbitrators of student learning with students being responsible for learning and deriving meaning

from their academic experiences. By developing connections to faculty and fellow class members, and by engaging in academic activities or social participation in the classroom, they are more likely to feel a sense of belonging and institutional fit than those students who do not engage with others (Tinto, 1993).

For effective academic learning to occur, students must be actively engaged and develop learning skills (Billett, 2009). Purposefully designed activities in various settings are provided to enhance student learning in AS (DMS) programs and other Allied Health programs.

Students can learn to connect "conceptual and procedural knowledge" which they obtain during classroom instruction, along with the knowledge and ability to make decisions on how to apply various forms of knowledge (procedural, personal, cultural, ethical, and propositional) gained at their clinical affiliate institutions (Nagarajani & McAllister, 2015, p. 280). Billett (2009) emphasizes the importance of encouraging and facilitating peer learning. He proposed that by facilitating peer-assisted learning sessions, using activities that are based on teamwork, providing opportunities for students to learn how to work with interprofessional and culturally diverse teams will enhance engagement at college and at clinical affiliates.

Institutions are tasked to design purposeful educational activities and encourage students to become involved in these activities for the benefit of the student, their peers, and the college community. Quaye and Harper (2014) argue that while involvement is good, it is engagement that matters, as engaged students often develop a stronger sense of belonging to the college. Students in AS (DMS) programs work in collaboration during clinical practice sessions in the classroom. Typically, one student is selected to be the practice patient, while the other student will practice or complete clinical imaging exams using scanning techniques of anatomical regions as prescribed in the clinical curriculum. Collaboration as an activity of teamwork or groupwork among students

and faculty during academics at college and during clinical education at clinical affiliate sites, enhances both academic and social involvement.

Chapter 3: Methodology

This study explored student engagement and persistence as reflected through their experiences in their third- and fourth-semester academic, social, and clinical environment of their AS (DMS) programs at two separate four-year state colleges.

A qualitative research approach was selected for this study because qualitative methods are useful in interpreting individuals' experiences to understand and make meaning of their social reality (Gentles et al., 2015; Mohajan, 2019). Qualitative research as defined by Denzil and Lincoln (2005) "involves an interpretive, naturalistic approach to the world". In other words, "qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them" (p. 3).

Qualitative researchers seek to know and understand how individuals give meaning to and experience their world in certain contexts and at a given time. Examining individual's experiences in the world and their perspectives thereof is based on the constructivist or interpretive perspective which is rooted in qualitative research (Meriam & Grenier, 2019). Ary et al. (2010) added that qualitative research provides flexibility to data as new knowledge based on the experiences or perceptions of participants may emerge. Researchers who are the primary data collectors must be able to change and adapt to data which is collected from either a descriptive or interpretative narrative. New data from participants may evolve into a new theory through inductive coding. In addition, qualitative research also uses small samples compared to large samples used in quantitative research.

Research Design

A basic qualitative study design was used to explore and provide descriptive, interpretative accounts of engagement and persistence through the lens of student experiences in a sonography program. Merriam (2009) suggested that a basic qualitative design is used by researchers to determine "1) how people interpret their experiences; 2) how they construct their worlds, and 3) what meaning they attribute to their experiences" (p. 23).

A small sample of eight female participants from two Sonography program populations at two separate colleges were selected to describe their experiences in a sonography program. An in-depth, semi-structured interview allowed me to explore how students interpret their experiences, construct their roles as students, and determine what meaning they ascribe to their experiences during their involvement in their sonography program.

Constructivism

Constructivism is described as situations in which individuals who experience the same phenomenon or set of circumstances, "perceive, interpret, and explain" the experiences differently (Ültanir, 2012, p. 196). A constructivism paradigm is typically associated with the qualitative research approach because like qualitative researchers, constructivism attempts to understand a phenomenon which is being studied from the experiences or perspectives of participants by collecting data in various ways. In addition, like qualitative researchers, constructivists contend that reality is subjective because it relies on the various individual perspectives of participants engaged in the study (Dickson et al., p. 5).

This basic qualitative research study therefore utilized a constructivist paradigm for the collection of data and analysis thereof. As such, all participants in this study are experiencing the same or a similar set of circumstances in the classroom, the laboratory, and at the clinical affiliate

of the AS (DMS) program. Their experiences gained by their involvement in the academic and social environment in the program, the college environment, and during clinical education at clinical affiliate sites, may vary. A constructivist approach is advantageous in that researchers and participants interact collaboratively, while participants relay their experiences and perceptions during interviews.

Research Setting

Qualitative researchers explore and study phenomena in their natural environment, and thereby attempt to understand or interpret it in terms of the meanings people attach to it (Aspers & Corte, 2019, p. 139). The research study was conducted at two separate four-year state colleges in Florida. These four-year state colleges were initially two-year public colleges (community colleges) which later expanded their offerings to a limited number of four-year bachelor's degrees. In Spring 2008, the Florida legislature adopted a bill which redefined the Florida Community College System as a system of colleges that grant two-year and four-year degrees to meet Florida's employment needs (Wattenbarger & Albertson, 2007). The Senate Bill 1716 creates a single Florida College System comprised of institutions granting 2-year and 4-year degrees as provided by law (State University System of Florida, Board of Governors (FLBOG, 2021). Approximately 27 out of 28 two-year public institutions awarded bachelor's degrees to students between 2016 and 2017. Additionally, approximately 7, 500 bachelor's degrees were awarded in 2015 and 2016 (Fulton, 2020).

Research Setting 1 - College A

The Associate of Science in Diagnostic Medical Sonography offered at College A is located in an urban setting in the Northwestern part of Florida. The college offers twenty-nine different Associate of Science Degree programs, Associate of Art Degrees, approximately 10

Bachelor of Science Degree programs, and over 50 vocational certificate programs. The AS (DMS) program does have a limited access admission process of between 24 and 32 students per class (College Student Demographic Statistics, 2021). The number of instructors who are recruited in AS (DMS) programs to provide curriculum instruction of sonography courses, ultrasound training, and supervision of clinical education rotations to students vary at times from one year to the next depending on a variety of personal and other factors. In the AS (DMS) program at College A, only one instructor was tasked with the instruction of all courses, imaging training, and clinical education planning and facilitation in 2020. This was the year this study was conducted.

All applicants to the sonography program must submit official transcripts, complete a TEAS (Test of Essential Academic Skills) test, and complete twenty-six credit hours of pre-requisite courses with a grade C or above and must have at least attained a 2.5 grade point average (GPA). These admission requirements are waived for students who have previously earned a degree in a related discipline. The mandatory two-year course sequence includes six terms with a total of seventy-seven credit hours. Clinical education offered concurrently with didactic courses are performed at health care institutions including local outpatient centers and hospitals (Commission on Accreditation of Allied Health Education Programs (CAAHEP), 2019). The AS (DMS) program at this college is not accredited by the CAAHEP, however it is recognized by the American Registry for Radiologic Technology (ARRT), under the college accreditation. Upon graduation, each AS (DMS) student is eligible to take the American Registry for Radiologic Technology (ARRT) sonography exam after they have "demonstrated competency in the formal classroom education (didactic coursework) and the program's clinical requirements" (The American Registry of Radiologic Technologists Handbook, p. 6).

They are also eligible to earn the Physics (SPI) registry credential through the American Registry of Diagnostic Medical Sonography (ARDMS) after graduation but are not eligible to take other ARDMS credentialling examinations until they fulfill various requirements as stipulated by ARDMS so that they can pursue it via different pathways.

After passing the SPI (ARDMS) registry, the ARRT exam, and fulfill specified requirement, they will be eligible to complete any ARDMS board registry exam (Personal communication with Clinical Coordinator, 2020).

Table 3

Graduation Rates of Students Admitted to the AS (DMS) Program in the Last Three Cohorts in College A.

Admission year	Number of Students Admitted.	Number of Students who Graduated	Graduation Year
2018	24	10	2019
2019	23	8	2020
2020	29	14	2021

Note: In the 2021 cohort, thirty-six students were admitted to the program and the class is still in progress. (College Student Demographic Form, 2021; IPEDS, 2021).

Research Setting 2 - College B

The second college (College B), is a medium college located in a suburban setting in Central Florida. The second college at which research was conducted was (College B), which is a medium college located in a suburban setting in Central Florida. Different offerings include Associate of Liberal Arts degrees, approximately twenty-three different Associate of Science Degrees, and approximately 7 different Bachelor Degrees . Unlike College A, this AS (DMS) program has a limited access admission process of only 12 students per class every year. Faculty

in this program consists of two primary instructors and an adjunct instructor who shares the responsibility of facilitating instruction of courses in the curriculum. One instructor is the acting program director while the other instructor is the clinical coordinator who instructs ultrasound imaging (Scan Lab) and who plans and facilitates clinical education activities for students at clinical affiliate institutions. All applicants to the sonography program must submit official transcripts, complete 20 prerequisite course hours with a grade C or higher and must have at least attained a 2.0 grade point average (GPA). Additionally, students must also complete four co-requisite courses by the end of the AS (DMS) program. A selection committee utilizes a college point system, the overall college GPA, pre-requisite GPA, number of credits that can be applied to general education requirements for the program, and healthcare related experience to select applicants to the program (Personal Communication with Program Director, 2021).

The mandatory two- year course sequence includes six terms of seventy-seven credit hours. Clinical education offered concurrently with didactic courses are performed at health care institutions including local outpatient centers and hospitals (CAAHEP, 2019). This AS (DMS) program is accredited by the JC-DMS or CAAHEP. Following the completion of all requirements for graduation from the sonography program, graduates are eligible to take the national registry exam administered by the American Registry of Diagnostic Medical Sonographers (ARDMS.org).

Table 4

Graduation rates of students admitted to the AS (DMS) program between 2018-2021 in college B

Admission Year	Number of Students Admitted	Number of Students who Graduated	Graduation Year
2018	12	10	2019
2019	12	12	2020
2020	12	11	2021

Note: In the 2021 cohort, 12 students were admitted to the program and the class is still in progress (College student demographic form, 2021; IPEDS, 2021).

Recruitment and Selection

Recruitment strategies must be implemented to recruit participants who can provide rich, in-depth information about the research topic. Merriam (2016) asserted that recruiting participants "is often the most challenging and resource intensive aspect of a study" when conducting qualitative research (p. 23). This occurs when researchers often underestimate the time needed to recruit participants. In addition, researchers may also lack awareness of the availability, interest, or eligibility of prospective participants (Archibald & Munce, 2015). Recruitment strategies appropriate to participant locations were implemented to recruit participants for this research study.

Letter of Request to College to Conduct Research

A formal letter of request to conduct research at their institutions were emailed to the presidents of both College A and College B. The letter informed and delineated what the study was about namely, a comprehensive description of the nature of the research and all activities that would be performed. The college presidents forwarded the letters to gatekeepers in charge of

research who included the Dean of Federal Programs at College A, and the Vice President of the Department of Effectiveness and Research at College B.

Gatekeepers are individuals authorized or empowered to grant or withhold access to research settings and participants in social research (Clark, 2011; De Laine, 2000). The gatekeepers from both colleges contacted me and emailed different forms for me to complete and return as stipulated by their Institutional Review Boards (IRB).

Institutional Review Boards

The college IRB performs a review of research that has been proposed to all academic institutions if research with human participants is being conducted, and if the institution receives federal or state money such as research grants. Institutions can choose to establish their own IRB, use a commercial IRB, or use the IRB of a cooperating agency (American Psychological Association, 2022).

The main objective of review and approval by the IRBs from both College A, College B, and the University of South Florida IRB was to ensure that there was no /or minimal risk to participants, and to ensure that participants were aware of their rights under the U.S Department of Health and Human Resources.

Requirements from the IRB to Conduct Research

Approval to proceed with my research was requested from the IRBs at both College A and College B. The IRB's requested that specific forms be completed and submitted to them for review.

The IRB forms at both colleges included, a) a signed copy of the 'Dissertation Protocol Defense' approval; b) the title of the research 'Exploring Engagement and Persistence through the Lens of Student Experiences in a Sonography Program'; c) the reason for conducting research, and the name of the researcher's university and committee members that would be supervising the

research; d) methods that will be implemented to keep participants safe from harm, and participant personal information and all future data derived from interviews risk free, private, and confidential (See Appendix B); e) a detailed description of the semi-structured interviews and one follow-up interview which would be conducted on Zoom video conferencing (See Appendix C); f) the length of time required to conduct research; g) storage of secure personal and interview information obtained by participants (see Appendix B); and h) a copy of an invitation letter I intended to email to students to elicit their participation in my research if I was approved by the IRB at College A and College B; i) a request to offer compensation to students who volunteer their participation in my research study at both colleges; j) an explanation that student consents would be acquired verbally as interviews would occur on Zoom video conferencing.

After receiving approval to proceed with my research from the IRBs at both College A and College B, I requested approval to conduct research from the IRB at the University of South Florida (USF). All relevant applications, forms (the same as those submitted to the IRB's at both colleges), and approval letters from the IRB's of both colleges were submitted to the IRB at USF who requested it (See Appendix E).

Requesting Student Participation

Twenty-seven students from two separate four-year state colleges were invited to participate in my research study. I emailed a letter containing a description of my study and the criteria required for students who would be interested in participating in the study to the program directors at both colleges requesting that the email be distributed among sonography students in their classess. students of invitation to students requesting that they participate in my study to the program directors at College A and College B with a request that they email the letter to students

(See Appendix A). This enabled students' school email addresses to remain confidential as stipulated by the IRB.

Both emails to students at College A and College B informed them of the criteria for participation, and small monetary compensation for their participation (College A) and donation to the Sonography Scholarship fund for their participation (College B).

Criteria for participation in my study included a) male or female students over the age of eighteen, who have persisted till the third semester of their AS (DMS) program at College A and, students who had persisted till the fourth semester at College B; b) third- and fourth-semester students who had previous experiences interacting with faculty and fellow students in the academic and social environment of the classroom and ultrasound lab at college, and with clinical educators during their visits to healthcare clinical affiliate sites; c) U.S. or international students could apply; d) students who either had to leave the program due to life circumstances or emergencies in either the first- or second- or third-semesters, or who failed out of the program in any of their prior semesters, but were found eligible to return and resume their academics or clinical education in their AS (DMS) programs.

Sampling

Sampling is a procedure used to select a specific situation, context, or participant who can provide an abundance of data of the situation of interest (Polit & Beck, 2017). Prior to selecting my sample size and design, I recognized the need to select a size design that would be most compatible with my research purpose. I also recognized that the sample design I select must provide quality interactions and rigor with my participants. A rigor that will ensure that the participants are free from harm, that I remain objective, and that privacy and confidentiality be adhered to throughout data collection. A few different sample designs used in qualitive research

that I could have selected to recruit my participants were convenience sampling, voluntary response sampling, snowball sampling, and purposive (purposeful) sampling. Convenience sampling which is prone to bias and typically used in marketing studies (Edgar & Manz, 2017) Snowball sampling, a form of sampling in which research subjects can identify and provide information about other prospective subjects (Kircherr, 2018) would have compromised participant confidentiality and privacy. Voluntary Response Sampling, which solicits volunteers in person, online, through emails, among others, seeks to divide target populations into voluntary and non-voluntary groups (Murairwa, 2015), would not have been compatible with my study.

Purposeful Sampling

I selected purposeful (purposive) sampling. Patton (2002, 2015) asserted that "the logic and power of purposeful sampling lie in selecting information-rich cases for study in depth". The information-rich cases are those issues, events or experiences which provide researchers with the understanding and knowledge they are seeking about issues that are central to the purpose of their research, hence the term purposeful sampling. Studying information rich-cases yields insights, creates in-depth understanding rather than empirical generalization" (p. 230). Hays and Singh (2012) suggested that purposeful sampling involves selecting participants who have experienced a specific situation to produce substantive descriptions.

Purposeful sampling was utilized to select diverse students based on their age (18 and older); participants who graduated to their third semester after completing their second semester in the AS (DMS) program at college A, and students who graduated to their fourth semester after completing their third semester in their AS (DMS) program at College B; participants who experienced the academic and social interactions with their instructors and their fellow students in the classroom and Zoom video conferencing from both colleges.

Sample Size

When selecting a sample size for research, the number of participants must be determined by and based on the amount of information researchers will require to ensure that they can be confident that the research question is sufficiently answered (Patton, 2002/2015). Hennink et al. 2017) suggests that sample size should be related to both 'code saturation' where no further data collection or analysis is necessary, and 'meaning saturation' where no more information and insights are required.

Sample sizes used in qualitative research studies are often smaller than those used in quantitative research methods. This, because qualitative researchers seek to understand a phenomenon, or focus on a meaning often centered on the how or why a situation, issue, scene, process or specific social interactions occur (Dworkin, 2012).

A demographic form was emailed to participants who were selected to participate in the study. They were requested to complete and return the form via email to my secure, password protected and encrypted email.

Saturation

After reaching the point when all data was exhausted, when the point of no new themes were reached data saturation was reached. Miles et al. (2013), suggest that data saturation plays a large role in studies of naturalistic inquiry where the research setting is in a natural environment. Saturation is reached when no new themes will emerge from any additional data (Given, 2016, p. 135). Urquhart (2013) argues that saturation is the point in coding when no new codes can be derived. On the other hand, Bryman (2012), asserts that data saturation is reached when all attempts at sampling, data collection, and data analysis have been reached (p. 18). Burmeister and Aitken (2012), argue that just because all resources have been depleted, data saturation has not necessarily

been reached. This, because data saturation is about the thickness or depth of the data, and not about the number of the sample size. In this qualitative study, the saturation point was reached when I recognized that students were repeating the same answers on questions that I had previously posed to them in previous themes and were unable to provide me with more information.

Pilot Study

Prior to the implementation of the major research study, a pilot study was proposed to determine the feasibility of interview protocol and questions of a major qualitative study. Guðmundasottir and Brock-Utne (2010) describes a pilot study as a trial run of the data collection methods that were planned for the large- planned study which include assessing the recruitment strategy, interview protocol, and guiding the main study's development. They also added that a pilot study can increase the quality of research and enhance its reliability and validity. Pratt and Yezierski (2018) suggested that "the use of a pilot study to test the method and interview guide further adds credibility and dependability to the study" (p. 417).

The pilot study was conducted at College A. After obtaining approval from the gatekeepers and college IRB to perform a pilot study, three participants who met the criteria were selected.

Data collection methods of the pilot study included semi-focused and in-depth interviews to test the feasibility of questions in the interview protocol of the major study. Interviews were transcribed, coded, and analyzed.

Pilot interview results prompted changes in the interview and questions, and that the interview application needed to be corrected. While scrutinizing my video recordings, reading interview feedback forms from participants, and field notes of my pilot study, I realized that I needed to focus on more effective time management during my interviews. I recognized that inadequate time management during interviews could be a deterrent for participants who may

choose to discontinue their participation because many students lead busy lives juggling multiple activities such as college, employment, dependents, and social activities. Additionally, more time spent on one aspect of the interview could result in losing valuable time that may be required for students to elaborate on answers required for other interview questions, and additional questions students may have at the end of the interview. Also, while I primarily focused on developing an effective, meaningful and useable interview protocol and questions, I learned that my role as the interviewer demanded more finesse and good technique to elicit deep and rich insights about participant's experiences. I realized that I needed to talk less and listen more. To avoid leading questions and had to employ a more effective steering technique instead of frequently interrupting participants who lost their train of thought during interviews resulting in the loss of useful data.

The interview protocol questions for the major study also needed to be refined by modifying lengthy questions, simplifying complex, confusing questions, removing jargon, repetitive and redundant questions, and adding more probing questions. The most important insight I observed from the pilot study was that students were individuals with different backgrounds, life experiences, personalities and characteristics, which influenced their academic experiences, perceptions, and perspectives about the AS (DMS) programs. It was therefore prudent for me to re-adjust and to modify my interview technique as I interviewed the different participants.

Results of the pilot study were reviewed by two members of my committee, found to be copacetic and suitable to be administered in the major study.

Interview and Data Collection for the Major Study

Data collection is described as the "process of gathering and measuring information on variables of interest in a systematic fashion" to be able to "answer stated research questions, test hypothesis, and evaluate outcomes (Syed, 2016, p. 202).

Informed Consent

A week prior to conducting interviews, I emailed the informed consent document which outlined the process and procedures, including potential risks that participants may be exposed to as the result of their participation (See Appendix A). Spaulding and Voegtle (2010) asserted that informed consent means that participants will acknowledge that they were apprised of all research procedures, possible risks involved in the study, and that they can withdraw from the study without any penalties. They must also declare that their participation is voluntary.

They were advised to make a list of questions they had pertaining to the consent process so that it could be addressed during a Zoom session. Participants were also advised that they had the option of withdrawing their participation for any reason they deemed necessary.

Interview Protocol

A semi-structured, open-ended, in-depth interview was conducted to explore and understand third- and fourth-semester student engagement and persistence as reflected by their experiences in AS (DMS) programs.

Preparation and organization were key for interviews to be conducted in a seamless and effective manner, so that the conversation could flow organically without any disorganized questions or uncomfortable pauses. An interview protocol was therefore developed. Patton (2015) explained that an interview protocol is an instrument used by researchers to enquire on a specific subject by asking questions to obtain information related to a study's specific aims. Jacob and Furgerson (2012) described an interview protocol as more than just a list of questions, but also an interview guide which will direct the interviewer through the interview process. Additionally, the protocol should contain a copy of all relevant questions or conversations to be held prior to the

interview, and information that will be collected during the interview and at the conclusion of the interview.

An interview guide which contained a list of prepared questions, issues, and relevant topics which needed to be addressed during the interview was used. This enabled me to guide my interview in the form of a conversation which allowed students to elaborate on their responses (Patton, 2015) (See Appendix C).

Semi-Structured Interviews

Semi-structured interviews are in-depth interviews extensively utilized when interviewing an individual or a group (Corbin & Strauss, 2008). To profoundly understand the experiences, perceptions, feelings and knowledge of individuals, researchers must utilize "in-depth, intense interviewing" (Patton, 2014, p. 2).

After reiterating the purpose of the research study and informed consent process, questions that individual participants had about the study and informed consent were addressed (See Appendix D). Each participant was requested to provide their verbal consent to participate in the study after they felt comfortable to do so. I also requested participants' consent to record interviews on Zoom, iPhone, a digital tape recorder, and to take notes during the interview. Participants were verbally informed that they could take breaks during interviews if and when they needed to and could withdraw from the interview at any time without any consequences.

These interviews would allow participants to discuss their positive or negative experiences in the academic, social, and clinical environment of their AS (DMS) programs during their first and second year. In addition, these interviews will provide valuable insights into student experiences, and a lens through which I can explore student engagement and persistence as products of their experiences in AS(DMS) programs in Florida.

After consents were provided, one ninety- minute semi-structured, open-ended interview was conducted on Zoom based on participant's preferences, and to support the college's social distancing precautions during the Covid-19 pandemic. Interviews were recorded on a digital voice recorder after obtaining participant's consent to do so. The objective of the interviews was to understand the perspectives of students and their engagement experiences in an AS (DMS) program. It was therefore important to use in-depth interviews in the form of open-ended conversations to allow students to express themselves uninhibitedly.

I began the interview by engaging in general conversation with participants to put them at ease and to develop a good rapport with them. (See Appendix D). The first question included "Why did you decide to pursue a career in sonography?". The answers to this question would provide valuable insights into participants' motivations and initial goals for entering the AS (DMS) program. The second question, "Did your program orientation provide you with the information you needed to prepare you the program?" attempted to understand the participants' first impression and mindset about the AS (DMS) program prior to entering the first semester. Jacob and Ferguson (2012) stated that better responses could be elicited by building a rapport with participants. Student engagement and persistence were succinctly defined and discussed to provide students with an understanding of the nature and scope of the study and interviews. Participants were reminded that I would be using fictitious names to protect their privacy and to maintain confidentiality. Prior to providing their verbal consent participants were reminded that their college names, personal data, and interview information provided by them would be private and confidential. They were also informed that all personal and interview information and data would be stored securely on the USF cloud.

The first few questions centered around their experiences in the classroom or online environment and their efforts to engage with faculty and fellow students during academic didactic and ultrasound imaging training. These questions were framed to make the participants feel comfortable, to familiarize them with the interview subject, to build a rapport with them, but more importantly, to elicit the information needed for this research.

By using broad, open-ended questions during the interview participants were able to talk freely and uninhibited. Austin and Sutton (2014) suggested that unstructured or semi-structured interviews may begin with questions that have been pre-defined but can be adapted and redirected based on the flow of responses to allow for more instinctive and natural conversations between participants and interviewers. Probing questions were also used to allow participants to elaborate on their answers.

The interviews permitted an understanding of students' experiences during their involvement in the academic and social environment of the AS (DMS) program and during clinical education at the clinical affiliate sites. Additionally, interviews permitted an understanding of students' views of their program environment, instruction, and support measures provided to help facilitate their learning, engagement, and persistence in the program. The essence of the interview was captured on Zoom video recordings, the iPhone, a digital tape recorder, and field notes. Field notes were used to describe and document discussions and observations during interviews. Phillippi and Lauderdale (2017) regarded field notes as an essential component in qualitative research as they provide additional documentation of deep and rich descriptions of the context and contextual data of the interview, focus group, or encounter. These notes may also provide additional information about an interview that may not have been heard but may be useful for enhanced understanding the meaning of the participant. I utilized a personal research journal as a

reflective tool to document any personal impressions, reactions, feelings I experienced during the interview, or subjectivities that may hinder the study. Boutiler and Mason (2012) suggested that a researcher can use a journal to acknowledge specific emotions and express and analyze their emotions so that it does not hinder the progress of the research. Additionally, they explained that conversations and other means of evoking thoughts or feelings such as songs, poetry, or drawings can be documented. Altrichter and Hooly (2005) suggested that research journals are tools with which the researcher can observe, question, critique, synthesize and act. They typically contain observational data gleaned during interviews, and informal conversations. Journals may also contain photographs and letters, reflections, information about the context, researcher reflections, and ideas and plans on how to proceed with the research. A journal also becomes a tool used for reflection at a time when important decisions must be made. This is termed reflection-in action.

The various recording devices allowed me to listen to participants, document what they were saying about their experiences, and observe their body language to glean more unspoken information. The data recording tools also provided a level of security to alleviate fears that data may be lost. It is imperative to use multiple devices in the event of operational loss or damage of one or more devices.

After the interview, information was retrieved from field notes, the research journal, and recordings were manually transcribed and emailed to participants. This enabled participants to evaluate transcripts for possible errors or incorrect interpretations of data provided during interviews (member checks). Four participants required a brief follow-up to clarify answers they had provided in the interview and to answer one or two few questions that were overlooked during the interview. These participants were contacted via Zoom online or facetime on their phones to

clarify nebulous answers and interpretations, and to address questions that were missed during the first interview.

Transcription

Prior to transcription, all participant's data was de-identified to maintain anonymity, privacy and confidentiality (Stuckey, 2014). All other personal identifying demographic information such as participants name, address, date of birth, and the like, was saved in a password encrypted file on my laptop and saved in USF Cloud.

After semi-structured interviews of participants were completed, interview data which was documented using Zoom video recordings, audio recordings, field notes and journals were analyzed and transcribed manually through a thorough and rigorous process. Sutton and Austin (2015) describe transcription as "an arduous process even for the most experienced transcribers, but it must be done to convert the spoken word to the written word to facilitate analysis" (p. 228). Verbatim transcripts are regarded by many researchers as the best way to convey meanings of interviews which can contain a copious amount of data and details (Cohen et.al., 2014).

After all interview transcripts were completed, I emailed participants their respective transcripts to review for accuracy. I requested that all participants review and return their transcripts withing three weeks. Only two participants were prompt in returning their transcripts within the three weeks as requested. Six participants did not return the transcripts within the requested time. I persisted with my requests for completion by sending two more emails reminded participants about their verbal agreements to adhere to study requests in a prompt and timely manner. After one week all participants returned their transcripts with typed notes either confirming that transcripts were correctly interpreted and transcribed or indicating where errors were made. Addended transcripts were emailed to participants again for verification. All

transcripts were verified and promptly returned by them. Transcribed interviews were then analyzed.

Ethical Protection of Participants

By its very nature, qualitative research studies could present moral and ethical challenges and issues for the researcher as they personally interact with the participants, or because of the structured or semi-structured conversational tone of the interview questions (Mahnaz et al., 2014). It is therefore imperative that the researcher determine that ethical standards are met, in accordance with the National Commission for Protection of Human Subjects of Biomedical and Behavioral Research (1978) which was established as the result of the National Research Act of 1974. According to the Office of Human Research Protections (2018) the Commission was tasked with identifying ethical principles that should undergird the conduct of biomedical and behavioral research involving human subjects and developing research guidelines that would ensure that research is conducted within the parameters of those principles. They therefore wrote a report called the Belmont Report which outlined among others, the basic ethical principles, which include the following: First, 'Respect for persons' which entails providing participants with autonomy by allowing them to freely discuss their opinions and choices without judging them or obstructing their views; Second, 'Beneficence' which is treating participants in an ethical manner by respecting their decisions, protecting them from harm, and ensuring that they are secure, and; Third, 'Justice' which is the fair treatment of participants according to their moral rights (Office of Human Research Protections, 2018). To ensure that the researcher meet the ethical standards when conducting interviews, she must ensure that the participant's rights is protected, right to privacy, right to autonomy and confidentiality, the right to fair treatment and the right to protection from harm. Informed consent must also be obtained (Klopper, 2008).

Prior to conducting the research, the Institutional Review Board (IRB) process was completed. Approval to conduct interviews were solicited and approved from the institutional review boards of both colleges where research will be conducted from the University of South Florida Institutional Review Board (IRB). After receiving approval from IRBs, I proceeded with obtaining informed consent from the participants.

All IRB guidelines such as confidentiality, assuring privacy, protection of the participant from harm and providing full disclosure to participants were adhered to (see Appendix E).

Thematic Data Analysis

Tinto's (1975/1993) Model of Student Retention will inform the thematic analysis of data collected to understand student engagement and persistence as reflected in the experiences in AS (DMS) programs at four-year state colleges.

Thematic analysis is described by Braun and Clarke (2006) as a "method for identifying, analyzing, and reporting patterns (themes) within data" (p. 79). These patterns enable researchers to identify what is important in relation to the topic and the question being explored in the research. Braun and Clarke (2006) also suggested that thematic analysis is an accessible and flexible method which enables researchers to make sense of shared meanings and experiences, differences and similarities, and unanticipated and unique insights and revelations of participants. Merriam (2009) asserted that the data analysis process enables the researcher to gain insights into the development of the research by combining the data, analyzing it, and reporting the findings. This study's findings were arranged through transcripts and themes. I expected themes to include; 1) goals for attending sonography program; 2) student experiences in the classroom environment during academic lectures; 3) social interactions between faculty and cohort; 4) experiencing challenges with certain academic coursework; 5) positive/challenging experiences during imaging class lab;

6) time management; 7) Support or lack thereof from faculty; 8) Challenging experiences during clinicals and clinical affiliate sites; 9) impact of COVID-19 pandemic on academics, and ; 10) transitioning from in-person classroom to online virtual instruction experiences.

I was surprised about the general agreement by the input by participants from College A about their instructor's unprofessional behavior and attitude and lack of support or encouragement which did not lead to effective learning and engagement, but instead became a catalyst for stress and apprehension among students.

During my career as a sonography instructor, I was aware that students had to balance their time between college and other peraonal responsibilites, which made trying to succeed in the rigorous, demanding program more challenging for them. It was therefore important for me to create a safe, nurturing, and supportive learning environment in the classroom and lab where interactions between my students and I were free from stress and frustration. To create that environment, I had to maintain a professional, approachable, encouraging, and supportive demeanor to motivate them to be more engaged in activities in the classroom, lab, and at the clinical affiliate institution.

During student interviews, answers to questions which pertained to academic and social experiences in the classroom were often directed toward lack of support and motivation from their instructor. Conversely, participants from College B responded favorably to questions about support and motivation from their two instructors. Participants from College B clearly articulated their frustration with their faculty who they perceived as being reticent about helping them access the college to practice their scanning during college closures resulting from COVID-19.

Coding

I familiarized myself with the data by reading the transcripts several times. Data transcribed from third-semester sonography participant interviews were analyzed first while data transcribed from interviews by their fourth-semester counterparts was analyzed afterwards. Data analysis included thematic coding by identifying words or phrases that denote meaning and which represented specific themes pertaining to the research questions. Saldaña (2003) describes coding as "a word or short phrase that symbolically assigns a summative, salient, essence capturing, and/or evocative attribute for a portion of language based on visual data" (p. 3).

Both inductive and deductive coding were manually done to analyze the data and develop themes. This occurred after several attempts of interrogating the data to ensure that all ideas and information were included. Inductive codes which consisted of the participants' own words or in vivo codes were captured to signify their lived experiences and to give meaning to the data. Inductive coding refers to a process whereby collected data is analyzed by the researcher by either reading and interpreting data content to develop specific patterns, themes, or interpretations subjectively (Bryman, 2013; Corbin & Strauss, 2015). Inductive coding is influenced by the content in the data. This is a "bottom up" approach.

Braun & Clarke (2006) asserted that deductive coding and analysis is a 'top down' approach where the researcher adds a series of ideas, concepts, or topics to preconceived themes used to interpret and code the data. The most used application of codes by researchers is a combination of both the inductive and deductive approach, primarily called the blended approach (Graebner et al., 2012). Both approaches have different strengths and weaknesses.

Inductive coding provides a closeness and reality to the data, while discovering the theoretical aspects later. Conversely, deductive coding brings theoretical relevance and structure while possibly losing focus of the data (Linneberg & Korsgaard, 2019).

Scholars have varied and solid opinions about the number of codes that should be used by researchers, though the range of numbers suggested indicating that they are probably arbitrarily selected (Elliott, 2018). Saldaña (2016), suggested that the "number of major themes or concepts should be held to a minimum but that there is no standardized or magic number to achieve" (p. 25).

I started the coding process by identifying and selecting words and phrases from each participant's interview response in the transcript. After initially coding the data of all participants, the codes were categorized. Each category was then divided into themes. The themes provided the lens through which I could glean and understand the experiences and views of participants. 12 themes were identified for third-semester participants, while 9 themes were identified for fourth-semester participants. The themes were further analyzed into categories of sub-themes.

Trustworthiness

To evaluate the qualitative content analysis of my study, I selected the foremost and most widely cited criteria for qualitative research developed by Lincoln and Guba (1981), which they termed trustworthiness (Anney, 2014). Trustworthiness is defined by Andrews and Halcolm (2009) as the "degree of confidence that the researcher has, that their qualitative data and findings are credible, transferable, and dependable" (p. 17). Pilot and Beck (2014) describes trustworthiness of a study as the level of confidence someone has in the data, the interpretation of the data, and specific methods utilized to guarantee the quality of the study.

Naturalistic inquiry qualitative researchers (Lincoln & Guba, 1985; Schwandt et al., 2007) proposed four criteria "credibility, transferability, dependability, and confirmability" to determine their proposed term "trustworthiness" which parallels the term rigor in qualitative research (Guba & Lincoln, 1982, p. 15; Anney, 2014; Satu et al., 2014).

Four criteria of Trustworthiness

Credibility

To establish credibility in my study I was transparent during the documentation and procedural process of their research findings. All correct and plausible information was obtained from the original data of participants and accurately interpreted according to the original views of my participants (Lincoln & Guba, 1985; Anney, 2014; Shaw, 2010; Yin, 2011). Participant member checks which allowed students to read through their transcripts to ensure that all information they provided was correctly interpreted and transcribed was used. This allowed for full transparency and credibility for participants. Another pertinent question that researchers must determine to evaluate credibility is "Does the data sources, most often humans find the inquirers analysis, formulation, and interpretations to be credible" (Lincoln & Guba, 1982, p. 15). Additionally, the Lincoln and Guba (1982) suggested that in addition to evaluating for credibility or to prevent losing it, researchers can engage in the following: "Prolonged engagement at a site; Persistent observation of participants; Peers debriefing; Triangulation, and Referential adequacy material" (p. 377-378).

Transferability

To ensure transferability, my research data that can be applied to other similar contexts which may include similar circumstances, populations, or situations is transferable (Anney, 2014; Lincoln & Guba, 1982, 1985; Satu et al., 2014). Guba and Lincoln (1982) suggested that

transferability is possible under certain circumstances, if sufficient "thick description is available about both sending and receiving contexts to make a reasoned judgement about the degree of transferability possible" (p. 16). Additionally, to determine that a study is transferable, the researcher must engage in "theoretical/ purposive sampling" and "thick description" (Guba, 1981; Guba & Lincoln, 1982, p. 17).

Dependability

In the context of qualitative inquiry, dependability can be described as the extent to which other researchers can repeat a research study and obtain consistent findings. Cohen et al. (2011) proposes that dependability in a study can be established when researchers allow their participants to evaluate the study to determine if the findings, interpretation, and recommendations reflect the data drawn from information by the participants. To determine dependability, Guba (1981) suggests the use of "overlap maps", "stepwise replication", and a "dependability audit" (Guba & Lincoln, 1982, p. 17).

Confirmability

Confirmability, as proposed by Guba and Lincoln (1982) is the degree to which the research study results are shaped by participants and can be confirmed by other researchers. Additionally, to adequately confirm qualitative research findings, Guba (1981) suggested that the researcher engage the following methods: triangulation, researcher reflexivity, and a confirmability audit (Guba & Lincoln, 1982; Bowen, 2009). Triangulation is described under credibility above. Reflexivity, as described by Lambert et al. (2010) is the practice of self-awareness, introspection, or reflection in which the researcher is involved in the research process in an active and deliberate way. Guba and Lincoln (1982) suggest that reflexivity is the practice whereby researchers "uncover their underlying epistemological assumptions", which means "formulating the study in

a particular way". I achieved this goal by utilizing a reflexive journal to examine my thoughts, attitudes, emotions, and perceptions while conducting interviews and analysis. I also used member checks by requesting that students confirm and verify that interview information provided by them was correctly stated and interpreted in the transcripts. The confirmability audit, like the dependability audit, can be used by auditors to verify research (p. 17). A Confirmability audit is integral to the research process because "an audit trail offers visible evidence-from process- and product- that the researcher did not simply find what he or she set out to find" (p. 307).

Chapter 4: Findings

This chapter reports on the study's main findings and presents the qualitative data to support it. The purpose of this research study was to understand student engagement and persistence as reflected by participant's experiences in the academic, social, and clinical environment of their AS (DMS) program.

Student Demographics

Eight participants who met the criteria to participate in this study were purposefully selected. All eight participants responded to questions about their demographics on a demographic form and returned the signed form to me. Demographic information included their age, sex, marital status, race or ethnicity was optional, previous college attainment, and employment status while enrolled in the sonography program. All names provided in the study are fictitious, to maintain the participant's confidentiality.

Participants were selected from two AS (DMS) programs offered at two separate four-year state colleges in Florida (previously two-year community colleges). Participants provided valuable insights about their engagement in a sonography program by sharing their experiences during interviews. Through the prism of participants' elicited experiences, rich and deep data was extrapolated through thematic data analysis which added insight to research questions during interviews.

Table 5

Study Participants Demographic Data

Participants	Third semester or Fourth semester	College A College B	Number of faculty	Gender	Age	Race/ Ethnicity	Marital status	Previous educational attainment	Employed during enrollment
Kelly	Third Semester	College A	1	F	27	Hispanic	M	C-L	U
Jamie	Third Semester	College A	1	F	20	White	S	C-L	U
Erin	Third semester	College A	1	F	27	Hispanic	S	AA	U
Meghan	Third semester	College A	1	F	46	Black	M	AS	U
Kristen	Fourth semester	College B	2	F	27	Hispanic	S	C-L	U
Abby	Fourth semester	College B	2	F	23	* N/A	S	AS	F/T E
Amina	Fourth semester	College B	2	F	26	*N/A	S	C-L	E (P/T)
Lea	Fourth semester	College B	2	F	26	White	M	C-L	U

Gender =F= female; M = married, Single- S; I= international student; AS = Associate of Sciece, AA= Associate of Arts, College - limited; U =unemployed, Employed (P/T) (F/ T/E), * N/A= Not Applicable

The findings that emerged from this study are intended to provide valuable information that could enhance student persistence until their completion in AS (DMS) programs. Additionally, the findings will seek to inform and enhance the understanding of administrators and educators about student engagement in sonography programs and programs in general. Enhanced

understanding and knowledge about sonography student engagement and persistence may lead to the development and implementation of well-informed practices, policies, strategies, and interventions to further improve student persistence at institutions. The findings may also contribute to the gap in the literature about student engagement in AS (DMS) programs at two-year public and four-year state colleges and universities and private colleges.

Research Questions:

1. What are the experiences of sonography students with their faculty during their academic trajectories and do they foster engagement and persistence in the AS (DMS) program?
2. What are the experiences of sonography students with their cohort during social interactions in the classroom and Scan Lab, and does it foster engagement and persistence in the AS (DMS) program?
3. What are the experiences of sonography students during clinical education rotations at the clinical healthcare educational affiliates and does it foster engagement and persistence in the AS (DMS) program?

In-depth, semi-structured interviews were used to collect data which were analyzed using thematic analysis. For that purpose, transcriptions along with researcher notes and member checks were used in the study. During interviews, participants in their third- and fourth-semester in AS (DMS) programs described their learning experiences while participating in classroom academics, ultrasound imaging training in the college lab, and clinical training at clinical affiliate institutions. Participant experiences reflected their interactions with faculty and their cohort during classroom academic and ultrasound scanning activities at college, and with clinical educators tasked to train them at clinical affiliate institutions. Student experiences were explored to determine if sonography

student engagement and persistence was fostered. After examining the data from interviews to identify common ideas, thoughts or patterns used by participants consistently, themes emerged.

Six themes revealed the engagement of third- semester and fourth- semester participants in the academic, social, and clinical environment of their sonography program during data analysis.

Table 6 below reflects the Themes, Sub-themes, Codes and Quotes which emerged to answer Question 1.

Table 6

Research Question 1, Themes

Research Questions (RQ)	**Themes**	**Codes and Quotes**
1. What are the experiences of sonography students with their faculty during their academic trajectories and do they foster engagement and persistence in the AS (DMS) program	1. Faculty and student interactions during academic instruction and learning.	Rough around the edges. Unapproachable. Personality not supportive. Does not give encouragement. A good, sympathetic person but does not know how to be a teacher. Stern and regimented. A sarcastic demeanor. An abrasive attitude. Very dismissive. Fair and supportive She seems nervous when standing in front of the class. Unsupportive and does not give encouragement. Sweet and relaxed disposition. Does not give motivation. She uses passive techniques which is boring. Reads a Sonography registry book, pauses to show pictures and uses anecdotes. Knowledgeable, but cannot impart knowledge. She is a good teacher. Ability to explain things clearly. She has structure and is flexible and versatile . Not knowledgeable about the content, Not much interaction. I'm not good in physics. Asks us to call the previous Physics instructor to answer questions we may have. Does not know answers to our questions and looks in the textbook for answers. She talks too fast so we must shout out questions. Only 1 PowerPoint presentation this year. She is scattered when she instructs. Tests are difficult. Deliberately makes her tests harder than they should be to prepare us for the registry. Feedback on tests is unfair. The questions are confusing. Feedback does not make sense. Even when we can prove that our answers are correct in the textbook. She will not listen and allocates incorrect grades.

Table 6 continued

		Tests are difficult. Deliberately makes her tests harder than they should be to prepare us for the registry. Feedback on tests is unfair. The questions are confusing. Feedback does not make sense. Even when we can prove that our answers are correct in the textbook. She will not listen and allocates incorrect grades. Answers do not make sense sometimes. She is critical and gives negative feedback
	2. Student involvement in learning	Be attentive Take notes while the teacher gives a lesson so that I can study the material. I prefer interacting with my instructor and classmates during instruction. Participate during lectures by asking questions, I answer questions posed by the teacher Participates in discussions. At home I do my homework, assignments, and study for tests. I spend about 24 hours a week on coursework. Doing homework, reading about 3 chapters, studying. If the teacher cannot explain the content, I read books, watch Utube videos and teach myself. Used every opportunity to practice my scanning. When the teacher opened the lab for practice scanning, I was there from the time the lab opened till it closed. I do my part and they do theirs, it is that simple. I am responsible for my own learning because I cannot rely on others. I must take the initiative and ownership of my learning, no one can do it for me. I thought of dropping out of the program because it is hard, but I have a family to take care of, quitting is not an option. I am going to finish this program no matter what. I must motivate myself.
	3.Challenging experiences and barriers during learning activities	Curculary (Vascular) was hard. I thought that I was going to fail. Physics is the most difficult course. It has different concepts that tie into each other. My teacher does not know how to teach Physics so we must teach ourselves.

Table 6 continued

		Obstetrics and Gynecology (scanning babies and women's reproductive organs) is a challenging course. Ultrasound scanning is the hardest for me because I am a visual learner. Too many abdominal pathologies I failed my scanning tests and had to leave the program for 9 months. Only 7 machines, 1 instructor, 20 students. Long wait for help Learning to be ambidextrous not easy Many imaging protocols to learn. Some take longer to learn than others. Insufficient time for tests. Different ultrasound machines, must learn buttons, and functions of machines Machines and other equipment may break down resulting in more time being wasted without practice. Probes may drop and must be sent out to be repaired resulting in fewer probes to work with. Assistant teacher on the phone all the time and gets frustrated when we ask her for help. Covid-19 pandemic college closures disrupted learning. Learning different technologies was hard. Confusion Lack of preparation Read for hours Technical disruptions during lectures. Sound cuts out, echoes, unable log in to Zoom. Online learning is so impersonal. Prefer in-person traditional class learning and interacting with my teacher and my classmates. To ask questions, we must unmute ourselves, ask a question, and mute ourselves. Miss the comradery of my classmates. Distractions I am distracted by noises outside the window or my sister in the other room. Grades suffered Long, boring lecture sessions. Hard to concentrate or pay attention for 8 hours. Daydream Leave the computer, get a snack and take the dog outside.

Research Question 1

What are the experiences of sonography students with their faculty during their academic trajectories and do they foster engagement and persistence in the AS (DMS) program?

Theme 1. Faculty and Student Interactions during Academic Instruction and Learning

This construct of faculty and student interactions during instruction and learning in the classroom and imaging laboratory was consistently mentioned by all participants during interviews. All participants described the positive or negative classroom environment created by faculty professional behavior and attitudes or lack thereof , and the extent to which their pedagogical skills and methods their fosters effective or ineffective learning, engagement and persistence in the program

Teacher Centered Instruction

All study participants described that the program environment and culture in the classroom viewed their instructor's demeanor as either promoting or impeding their engagement and learning experiences in the program. They discussed their interactions with faculty in the classroom and laboratory and the impact that their faculty's demeanor (attitude and behavior) had on either promoting or impeding their involvement and learning experiences.

Kelly, a third-semester participant explained that experiences during interactions with her instructor were both positive and negative at times because she is unsupportive and critical. She explained:

> Our teacher's personality is one that is not extremely supportive. I do not think that it is any fault to her, she is just the type of person that does well off criticism and negative feedback. So, I think that is how she operates her classroom.

Jamie, a member of Kelly's sonography program disagreed with Kelly's assessment of her instructor by describing her instructor's personality as being unrefined but a good and sympathetic person. She shared:

> I do not think that she is negative, it is just her personality, she is 'rough around the edges. She is very sympathetic. When something bad is going on in your life she wants to help you. Like when my grandpa died, I went to the hospital. She called to see if she could help. I think that is very sympathetic. She is a good person, but she just does not know how to be a teacher.

Meghan agreed with Kelly and described that her instructor was unsupportive, stern and blunt which made Meghan hesitant about approaching her to talk or ask questions. She explained:

> I would not say that she is the most approachable, but she has a stern sense about her,
>
> She is abrupt. Like I said, there could be more support.

Lea described the demeanor of her two instructors in the classroom. She described one instructor as being nervous and the other as sarcastic. She shared:

> Ms. Y. is a little nervous speaking in front of groups but whenever you ask her a question, she has no problem answering or getting you the answer from the textbook. Ms. Z. is sarcastic but am a sarcastic person, so I clicked with her sarcasm, but some other students do not.

Kristen compared the attitudes and behavior of her two instructors and the effect it has on her learning. She described one instructor as good natured the other as negative and defensive: She explained:

> Ms. Y. is a lot of fun, and she does listen to us, but Ms. Z. has a way of I guess not being approachable. At times she has a negative connotation, and a lot of times, she is very defensive.

Abby compared the personalities of her faculty and described one instructor as being relaxed and well-natured and the other instructor, a strict disciplinarian who manages the classroom well. She explained:

> Ms. Y. is super sweet and laid back and, Ms. Z. who is my clinical coordinator, gave us the tough love which gave us the perfect balance. We knew that we had to be on our toes. She gave us that little boost that we needed.

Research has proven that a classroom climate, where positive, healthy emotions are fostered by faculty will result in motivated students who feel valued and supported, and who enjoy engaging with their faculty and cohort during learning activities. For instance, Tinto (2015) asserted that student engagement in learning is shaped by pedagogies and the values and attitudes of people in the classroom, especially faculty. Additionally, he suggested that institutions should not only be aware of faculty pedagogical skills but "how their behaviors, intentional or otherwise, also influence student success" (p. 261).

Similarly, Jang et al. (2010) asserted that "when students engage in classroom learning, there is always some aspect of the teacher's behavior that plays a role and regulation of the engagement," (p. 588). Many studies have indicated that teachers who motivate students increase and enhance their engagement (Quin, 2017).

Participants in their third semester described instructional methods used by their instructor as ineffective because she implemented passive instructional techniques that did not consist of much interactivity. They described their instruction as primarily consisting of following in their

textbooks while their instructor read content from a textbook. Most of the participants in their fourth semester enjoyed the balance created by the two different personalities and pedagogical skills of their instructors.

All study participants complained about suboptimal Physics instruction by faculty. The reasons provided were that they were either knowledgeable of the content but could not impart the knowledge, or because they did not have a good knowledge base on the course, student involvement and learning were impeded.

Meghan explained that her instructor uses a very passive instructional method which mainly consists of reading from a book: She explains:

She is knowledgeable but we mainly read from a book.

Kelly corroborated Meghan's assessment and elaborated that her instructor also uses pictures and anecdotes to support her content she is teaching: She shared:

> She consistently reads from a textbook which is the SDMS registry review book. So, it is a bulleted textbook in condensed form. She will at times pause to show us an image, picture or something, but we primarily read through the book for the duration of the lesson.

Jamie also corroborated Kelly and Meghan's sentiments about passive instruction. Furthermore, she described her instructor's lack of Physics content knowledge and her inability to answer student questions on the content which impedes Jamie's learning. She explained:

> I prefer face-to-face instruction if my instructor gave us more interactive things in class.
>
> When we ask our instructor questions us about physics during the lesson, she asks me to call the previous instructor who retired to ask her for the answer. That is not right as physics has many concepts and it all ties into something else. It is hard to learn like this.

Participants in their fourth semester described their two instructors as providing the perfect balance for an optimal instructional environment. One instructor, though good- natured, was not always fully knowledgeable about course content and was frequently remiss in providing prompt feedback on questions pertaining to the content. In contrast, the other instructor was described as "stern", "straightforward", and a "strict disciplinarian" who was very structured and used good pedagogical methods conducive to learning.

Kristen described that one of her instructors lacked a thorough knowledge base of the course content she was instructing resulting in her regularly having look up the answers to student questions on the content in the textbook. In contrast, she was very complimentary to the instructional approach used by her other instructor whom she regarded as a good teacher. She shared:

> Very frequently, when we ask Ms. Y. a question during a lesson, she will constantly say "I will have to get back to you on that" because she is not always knowledgeable about the content. She taught Cross Sectional Anatomy, and this does not reflect on her as a person, but I must say that the 2 courses that she taught were very scattered. The other instructor, Ms. Z. is a great teacher and has a lot of information to give and that is what is so awesome about her. She taught the Procedures and Protocols course, and I must say that I like how she did it. She has the most structure in her classes.

Lea shared the same viewpoint as Kristen and described the how effective one of their instructors was a tailoring her teaching methods to the different learning styles of students in the class instructor was at instructional versatility to enhance student learning, compared to her colleague who lacked that skillset: She explained:

> Ms. Z. is a good teacher, and clear. She finds ways to say the same thing differently so that all people can understand but Ms. Y. does not really have that ability. When someone does not understand the content and asks Ms. Y. to repeat it, it takes her a moment to search for the answer in the textbook. She does sometimes talk very fast so I will raise my hand and ask her to repeat her statement or just slow down when she speaks.

Amina discussed her frustration with their adjunct instructor's ineffective online Physics instructional method, especially the inability of their instructor to provide answers to pertinent questions posed by students on the content. She shared:

> Ultrasound Physics is a very difficult course to learn. The adjunct instructor is good at Physics, but it does not mean that she knows how to explain it to us. When we ask her a question, she will not be able to answer us immediately, but will write it down and tell us that she will find the answer and email it to us after class. The minute she says that "I think", I stop listening. When she finishes the lesson, I find the answer myself by reading the textbooks, I also watch Utube videos presented by other professors. That is how I passed physics.

Faculty who are recruited and tasked to instruct students in AS (DMS) programs, are required to be equipped with complete knowledge of the course content they are required to instruct, have pedagogical skills to successfully impart that knowledge to students for their enhanced learning. Tinto (2015) suggested that institutions should provide faculty development programs to ensure that faculty possess pedagogical skills needed to help students learn and gain success in the classroom. He also asserted that students are more likely to persist and graduate the more involved they are in the academic and social environment.

Hunt et al. (2009) argued that faculty are presented with the challenge of identifying and mastering pedagogical strategies and behaviors regarded as effective teaching practices and to tailor them to individual students or groups of students at the appropriate time, and in specific situations during instruction to meet desired learning outcomes.

The common view among third-semester participants was the high degree of difficulty of their instructor's assessments. Questions for tests were confusing as a few participants believed that it was hurriedly prepared the day of the test, and the feedback was not always accurate. The intransigence and inflexibility of the instructor who refused to accept student's answers even though they could prove that it was correct in the textbook or online research resulted in regular conflicts in the classroom. Participants in their fourth semester did mention the difficult physics tests they were given by their instructor who did not know how to impart content knowledge

Meghan explained that the assessments given to them by the instructor were very difficult and that they were intentionally done. She is concerned that she may fail out of the program because every test grade weighs heavily on her final grade. She explained:

> The testing is extremely difficult. She gives some very difficult tests, and last semester since we just completed it, I believed that I was doing well and I was maintaining my grades but then when it came to finals, I was apprehensive because it weighs heavily on the grades. I Know she makes her tests hard intentionally because I guess she feels like it helps us to prepare us for the registry's. Many of us collectively feel that she deliberately makes questions confusing, instead of making it a learning experience.

Alia discussed the types of questions of their tests which she thinks is hastily put together by the instructor the same day. She also describes the con-constructive feedback that is confusing and does not make sense. She shared:

> Her tests are super weird. She will make them up the same day we must take the test and ask us questions that we did not cover in class. Many answers to test questions that she gives us were not correct, they do not make sense. We do know where she is getting her answers from. What can I say, she is the instructor, and it is frustrating because it happens every semester.

Kristen described the lack of clarity by their instructor who advised them to focus on specific study material to prepare for a test. She shared:

> Some of the things Ms. Z. told us to focus on for the test were unclear, but other than that, everything else was good.

Amina discussed her challenges during online instruction of the Sonography Physics coursework and arduous tests. She said:

> The teacher did not know how to teach physics and her exams were super hard.

Assessment and feedback experiences for participants in their third semester were frustrating events which resulted in conflict between the instructor and students. Only one participant in her fourth semester described that tests in their program were confusing. Tinto (2012) suggested that frequent assessment and feedback of student performance in ways that enable both students and faculty to adjust their performance to achieve success will foster engagement and success. Crosling et al. (2009) arrested that irrespective of the types of assessments administered to students, the feedback must always be constructive, graded in a timely manner, and interwoven into students' learning experience to motivate students to remain actively engaged in their

Theme 2. Student Involvement in Learning

All participants described the importance of applying effort and owning their own learning and achievement and not relying on their instructor or cohort to do it for them. Participants

described engagement as “being involved,” “committed to,” “engrossed in,” “immersed in,”and “dedicated to” as they talked about believing that they could do courses that they experienced difficulty with, navigated challenges and obstacles with tenacity and resilience in the program and their personal lives that threatened to thwart their goals, and found the determination and self-confidence by their drive to succeed. Various learning strategies were employed by participants to enhance their understanding, learning, and studying of course content in the classroom and ultrasound imaging lab (scan lab).

Effort and Self-Efficacy

Third-semester participants emphasized the importance of being attentive and focusing on course content being delivered during instruction so that pertinent facts and content could be memorized and not overlooked. Despite their passive learning environment of following along in their textbooks while the instructor read from her textbook, pausing only to show pictures, or providing anecdotes to support the lecture they attempted to remain engaged by posing questions about the content. They also took notes and participated in class.

Learning also occurred in the sonography imaging lab which is a simulated clinical environment which demands collaboration between students who worked in pairs. Assigned partners were tasked to practice their scanning and protocols on their partner who is a simulated patient. A stipulated time is stated by the instructor for the student to practice imaging skills and protocols after which the partners change roles allowing the other student to practice his/her imaging techniques and protocols. Participants described the importance of being engaged with their instructor who taught new protocols and taught them imaging techniques and their cohort with whom they interacted during scanning session. For participants, involvement did not end in

the classroom or lab but was ongoing after college as homework assignments, projects, and studying was the mainstay. Kelly shared:

> I like to be fully immersed in what I do. In the classroom there can be a kind of back and forth, a sense of conversation amongst the students and the instructor. You can ask the instructor a question, or to clarify or repeat something. It is just extremely easy between the students and instructors, and everyone tries to be involved.
>
> I am totally invested and focused on my college work and studies. I have a study routine and a arge chunk of the day goes into studying and schoolwork and I attend college regularly. I think it also depends on the student, for instance, I use every moment I get to scan and to learn, and I believe that I am doing well**.**

Erin explained:

> This semester is much better than prior semesters. I feel like I am getting into a better routine. My study habits are better, and I have learned to ask questions.

Alia described feeling socially uncomfortable in class and disliked speaking in public. She shared:

> I was just so very uncomfortable, like socially uncomfortable I did not know what to say. Every semester she gives us projects where we must get up and present these projects before the class, I just hate it. So, we have about 10 of them and I hate it so much. I just feel so uncomfortable and hate it, but I am getting used to it now.

Amina, a fourth-semester participant, described the importance of students needing to take ownership of their own learning by being engaged and self-motivated to succeed. She explained:

> I did very well in all the classes. Because I'm very focused, and I believe I am disciplined so I do not need my teacher to tell me to do this or that. I do my part if they do their part, it is that simple.
>
> I feel good about scanning because I put in a lot of time to learn and practice. If Ms. Z. offers to open the lab for us for extra practice time on a Monday, I will go in every Monday from the time she opens the lab till we are told to leave. I practice my scanning and protocols without stopping. If no other class members come into college to practice scanning, I will practice on a simulated phantom. I cannot rely on anyone else but myself. So, that is why my skills are good compared to some other people in my class who did not invest time when we were able to do additional scanning practice.

Study Participants recognized that being passive about their learning and not being fully invested could impede their progress and achievement in the sonography program. Additionally, they recognized the need to take the initiative and ownership of their own learning by being engaged in learning activities in the classroom and beyond the walls of the college. Tinto (2015) explained that self-efficacy is one way that individuals demonstrate how they view themselves based on experiences and interactions with others and their ability to exercise a specific level of control over their circumstances. He adds that a specific sense of self-efficacy will determine how an individual will address tasks, goals, and challenges. Chemers et al. (2001) found that individuals with a high self-efficacy are more apt to engage in a task, exert effort, and persevere toward completing a task despite any challenges along the way.

Theme 3. Challenging Experiences and Barriers during Learning Activities

Students who enter the sonography program soon learn that the program is rigorous and challenging. Various courses in their curriculum are very new to them and difficult to learn.

Among a few courses that fit that description is Physics, ObGyn, Vascular, and others. The Scan Lab hands-on component of the curriculum has its challenges in the simulated healthcare environment of the classroom as students learn to apply their psychomotor skills and interactions with their teammates. Navigating the AS (DMS) didactic and imaging training curriculum during the Covid-19 pandemic exacerbated challenges students were experiencing even more as students transitioned from the familiar in-person classroom environment, to the unfamilar environment of virtual online learning.

Jamie described how challenging the program was by articulating the issues she encountered during the Circulatory and Physics courses. She explained:

The program is hard and difficult. Physics is the most difficult. I was very good at basic Physics and Math, but I don't know what is happening now.

We have all been holding on very tight. I was afraid that I would fail Circulatory. Circulatory focuses on every artery and vein in the whole body.

Abby described overwhelmed by having to adapt to her prescribed reading chapters for every lesson in preparation for class the next day. She explained:

Physics, and Obstetrics and Gynecology were challenging. It was a little overwhelming because I had to adjust to reading three chapters and doing my homework and then making sure when I got to class if a question was asked, I made sure that I could answer it. Scanning is the hardest. I am a visual learner, so this is challenging.

Lea explained that she did not do very well in her grades. She explained:

My grades were C's or D's. Cross sectional Anatomy was a little challenging.

For most of the participants, sonography courses, especially Physics, were cited as being the most difficult course. The reasons for this as suggested by participants included insufficient

knowledge base from instructors, or the inability to impart Physics content knowledge from a new instructor who had to instruct the course in an online format. Tinto (2006) asserted that faculty who enter higher education as instructors are not training to educate students. Therefore, faculty development is a "critical part of a long-term institutional strategy to increase its capacity to promote students' success." (p. 17). Also, Flinders (2013) asserted that faculty must possess the skills and knowledge to provide students with the best learning encounters. Faculty who recognizes specific courses that students find challenging, must in collaboration, give them the tools to apply their knowledge in critical or creative ways to answer questions or solve problems (Paolini, 2015). Tinto (2006) also suggested that supplemental instruction programs to assist students who may need academic support in a particular course appear to be very effective in aiding toward success.

Study participants described their academic schedule at campus as typically encompassing didactic instruction in the classroom for approximately 3 hours, and ultrasound imaging training called scan lab for 3 hours after lunch, in the sonography laboratory. They described how they had to adjust to learning the new skill by learning the dynamics of ultrasound equipment such as the functions of knobs on the machine and the different transducers (probe) used to form images of soft tissue structures in the body. They all admitted that scan lab was very challenging at first as learning included being ambidextrous by forming an image with the one hand and typing with the other, using hand-eye coordination when scanning and applying theory learned in the classroom to practice their protocols.

Kelly discussed the challenges she experienced during learning activities in the lab especially regarding the suboptimal assistance she received from an assistant lab instructor who made excuses not to help when Kelly asked for assistance. She explained:

> This semester we had an assistant teacher during scan lab. We have not felt that we have received any support from her because she is on the phone all the time. When we ask her questions, she becomes frustrated when we interrupt her cell phone. I feel like when I am struggling to find an image, or I do not know how to find something on the machine, the teacher should be willing to get up from her chair and come and help me. Instead of helping, our assistant teacher will tell us that she does not know how to use the machines so she cannot help up. When we ask her to come and help, us she will literally make the comment, "you guys are killing me" and tells us that she does not know how to use the machines because there are different to the machines she uses at work every day.
>
> In contrast, when the main teacher is doing scan lab, that does not happen. She does try to help us. She guides our hands to help us. She has been very effective this semester. She would be good at being a lab instructor because she knows how to scan, she knows the windows, and how to optimize an image. She knows how to teach us to do what we need to learn.

Erin discussed the insufficient opportunities she received to practice her scanning which stifled her learning. She noted:

> In the second semester, we started scanning but I didn't get much scan time. So, I thought that it hindered me a little bit and many of us struggled with exams, and with scanning.

Meghan discussed the emotional trauma she experienced after failing her scan lab the previous year resulting in her leaving the program for 9 months and only being allowed to return the following year. She also described the reason for not passing scan lab and challenges she experienced. She explained:

> I did not pass satisfactorily in my scanning portion the previous year. I wound up having to sit out for about 9 months because once I got to the summer course, we only had one instructor who was not able to devote much time to each student. We had 20 students who had to share 7 machines, so we did not have much scanning time especially if we had 4 or 5 protocols. Also, the machines were different. So were had to learn to use different machines. We were given 10 minutes to practice our scanning on one station, then we had to rotate to another, and another which was rather difficult.

For Jamie, learning ultrasound imaging protocols which include a sequence of image acquisition and imaging skills and then applying what they learned during their sonographic imaging practice during tests was challenging. She added that they were tested and graded on these imaging protocols during scan lab but given insufficient time to complete the tests which was disconcerting.

To underscore the imaging challenges, she mentioned the drop-out rate of her cohort. She explained:

> We had to learn all the protocols and scan the full protocols. We were tested on this. She gave us 15 minutes to do the full protocol and she would time us. The time was just too short to scan everything, I give you that. In the second semester about 9 students dropped out. Some struggled to scan. we had to pass all our scan tests and some of them just could move on. Some of them just could not get it. She gave them many chances to do it, but they just couldn't do it.

Kristen's frustration about her scanning was palpable when she explained that their inability to attend scan lab after colleges shut down during the COVID-19 pandemic, was advantageous and impeded their imaging skills and learning:

I am just not at the level that I wanted to be at. I am already hard on myself as it is. We can study content material and ace the tests, but in sonography it all boils down to can you scan, can you find abnormalities, do you know what normal is, getting the techniques, fishtailing, you know, things of that sort, those are the core things in this career, and I feel like I am lacking and am so frustrated.

Abby explained:

The lab part, which consists of ultrasound scanning is the most difficult part of the program. I am a visual learner and I feel I need more time to assimilate something.

Study Participants acknowledged the importance of scan lab practice an integral part of sonography student education Through hands-on imaging training and practice in the laboratory (scan lab), students can apply class-based knowledge and imaging skills to clinical training and experience at the clinical affiliate institutions. Challenges pertaining to Scan Lab as mentioned by participants need the correction and intervention of program directors and lab instructors to ensure that students receive the quality training, they deserve to be successful at college and to prepare them for workforce. Left unchecked, challenges during Scan Lab can lead to suboptimal training and learning which ultimately may lead to disengagement and failure or even withdrawal from the program.

A common view among study participants was that precautionary measures to close education campuses during the COVID-19 pandemic presented them with some of the most challenging experiences in the program. They described that transitioning from in-person to virtual synchronized online learning was an adjustment at first and challenging. They were especially frustrated when realizing that scan lab sessions we cancelled as the campuses would be closed.

Preferences for in-person class learning, and technological interruptions and disruptions, distractions during online learning, and missing the bond they had with their peers were mentioned.

Kristen explained the frustration she experienced when she was told that they could not access the sonography scan lab to practice their imaging (scanning). She explained:

> Mid-March was when we were told that we could no longer attend the campus and that was frustrating. Yes, it was hard going from class instruction to Zoom. COVID-19 hit and we basically had what a month and a half of scan time and you know we only went back to college in the middle of July. So, we lost a big chunk of our year not scanning.

Erin described losing the motivation to learn because she missed the face-to-face classroom learning and was unable to bond with fellow students. She explained:

> During the first three months of the program, COVID-19 hit. One day she tells us that we are going to online learning that on Zoom. And so, the rest of that semester is carried out on the computer. You kind of lose that motivation a little bit because you don't have that face-to -face learning and you don't get to interact with your fellow students, and you don't make that bond. Everyone was quiet and did not want to talk and help each other out. That was rough.

Abby described her experiences of various distractions which drew her attention away from the instruction they were receiving online and impeded her learning. She shared:

> I get distracted. I feel like when I am in my home setting, I tend to be slightly distracted during online instruction especially if I sit at the window. I listen to what my sister is saying in the other room or try to see what is going on outside, or I may think let me get up and grab a snack.

Kelly shared a similar view to both Erin and Abby as she described her preference of in-person comfortable classroom learning with faculty and her cohort. She also described the distractions which impeded online learning and missing the camaraderie of fellow students. She explained:

> With COVID-19, I think it was quite an adjustment going to online classes.
>
> At first, we all hated online learning because I learn better in the classroom and feel more comfortable learning there. When I am home, I feel like there can be distractions and that is why I don't take online classes. I don't learn well. Online, we are all muted, so things are very intentional. You think twice about asking a question because you must unmute yourself, ask a question, make sure that your sound didn't cut out, and that there is no echo or something like that. Lacking the comradery by not being in class with my classmates. I really think we have been lacking that bond. For us, it is just faces on a screen. Some people need that interaction with others and sometimes that is the only way for us to make friends.

Meghan talked about challenging experiences she had while learning new technology and adjustment to online learning: She explained:

> It has been an adjustment because I am traditionally a better student in the face-to-face traditional classroom environment. So, it was an adjustment getting used to learning in the virtual environment with Zoom, But I feel like I have adjusted to doing it. I am not the best at computer technology.

Amira described the technical issues and difficulty understanding physics that was taught online. She explained:

> In March when COVID-19 hit, we sometimes used canvas, sometimes Zoom. It depended on whether people had problems with connections you know. Sometimes all the schools

used Zoom, so Zoom was sometimes overworked so it was a little messy in the beginning. It was hard learning from home because you cannot feel your classmate's energy. You get distracted**.** We did Physics online and it was not easy. In previous Physics courses, our instructors would do calculations on the blackboard so that we could follow and learn every step while she did it. When we did it online, our teacher just showed us calculations on slides. It was her first time teaching the course and she would apologize when we explained to her that we could not understand the calculations from a slide and that she had to actively show us the calculations while we were online. So, I had to teach myself.

For study participants, the change in trajectory from the landscape from brick- and- mortar traditional classroom learning to adjusting to long hours of online instruction was challenging. Technological disruptions, distractions which drew their attention away from learning, and missing the bond and interaction with their peers, resulted in suboptimal learning conditions.

Despite the challenges they experienced during online learning, all the participants returned to college to resume their academic instruction and imaging practice in Scan Lab by using Covid-19 precautions. This was an indication of their tenacity and high self-efficacy as earlier asserted by Tinto (2015) who asserted that individuals with a high self-efficacy will readily engage in a task and work harder toward goal attainment.

When participants returned to college to resume in-person learning in the classroom and Scan Lab, their faculty compensated their lost practical scanning opportunities by providing increased hours for scanning practice after college and during the week or weekends on their day's off. These considerations and support from faculty provided additional scanning practice for students to catch up on time they missed during the COVID-19 pandemic which enhanced their learning and scanning skills. Additionally, third-semester participants began their clinical rotation

and fourth-semester participants resumed their rotations to college affiliate institutions to continue their clinical scanning training and instruction experiences. By receiving independent and supervised scanning opportunities from clinical instructors and sonographers who trained and instructed participants, they recouped valuable lost scanning time and practice to improve their scanning techniques and protocols.

Table 7 below reflects the Themes, Sub-themes, Codes and Quotes which emerged to answer Question 2.

Research Question 2

What are the experiences of sonography students with their cohort during interactions and do they foster engagement and persistence in the AS (DMS) program?

Theme 4. Social and Learning Engagement with Peers in the Classroom

Study participants described specific times and semesters during the sonography program when students started forming friendship bonds and a camaraderie with fellow students. They explained how by forming chat and study groups they were able to work together collaboratively, talk about similar issues they were having in the program, and became support and motivational groups.

Table 7

Research Question 2. Themes, Codes and Quotes

Research Question 2 (RQ)	Themes	Codes and quotes
2. What are the experiences of sonography students with their cohort during social interactions in the classroom and Scan Lab, and does it foster engagement and persistence in the AS (DMS) program?	4) Social and learning engagement with peers in the classroom	Friendships Camaraderie Listening Same challenges Motivating Encouraging Same life experiences Celebratory drinks after finals Bowling after college Understand me Social person Trust Builds confidence Hone better study skills Share or add to lecture notes Discuss homework Collaborate Have ZOOM study sessions Remind each other about quizzes Group members who have a better understanding of content Explains content to us who are struggling Email additional pictures and study notes. Study together for tests. Quiz each other

Bonding and Collaborative Learning

Abby described forming a bond with class members during the program orientation. She noted:

> During the program orientation we all started bonding. I felt very confident because when I started talking to my classmates about what we wanted to do in the future, we had the same ideas, and we were all going through the same changes in life like adjusting our work schedules and life schedule, so I did not feel like I was going through this alone. I had other

people that I could relate to. So, when I came to class and I was nervous and scared about an exam, so they were all feeling the same way.

Kelly explained bonding more with her fellow students in their third semester when the class dwindled down from 24 to 13 students. She shared:

> We started bonding more by the third term when our class became much smaller, and when we became more invested in the program. I was super excited about the last day at school. After taking our last two finals on campus, we all looked at each other and said should we all go out for some celebratory drinks? We all agreed to do it. We all started to chat with each other and decided to get together and go bowling before school started.

For Meghan, it was hard to adjust to the members of her cohort who had formed exclusive friendship groups in the class. She explained:

> There is and was still a certain dynamic where certain groups, group together in our classes. I think this time since I returned after failing out for 9 months, I started with a new cohort, they try a little harder to interact, but they still have their exclusive groups.

Erin agreed with Kelly and added that friendships were formed, and the students started trusting each other. She explained:

> In the third semester, everybody started helping each other out, forming relationships, and we learnt to trust each other.

Kristen explained that irrespective of people's personality or attitude, she gets along with them because she is a social person She shared:

> So, I feel like I made my way, and I found my people, although I get along with everyone in the class. I was able to find who I needed to study with and on occasion get their feedback

on something and maybe get their tips and tricks on something. And I feel fortunate in that respect.

Jamie shared that the students started bonding with each other during the second semester when they started scan lab in the laboratory because they had to work collaboratively. She shared:

> If I am really confused about something or do not understand any content, I first text my instructor and if she cannot explain it adequately through a text, I text the other students in my class or do a virtual meeting with them on Zoom. We all have group chats.

Abby explained that she, together with a few members of her cohort, formed a chat group with whom they could discuss homework and content on courses which they they were experiencing difficulty. She explained:

We created a chat group, and we send each other reminders about tests we have coming up, homework, and if we don't understand something we take a picture and send it to everyone in the group and whoever has the best way to explain it, to want us just texts back the explanation or answers about it.

Kristen discussed the importance of having a chat and study group with whom she could engage, by talking about topics in general and with whom she can work with in chat and study groups to enhance her learning in the program: She shared.

> I have a couple of people that I speak with daily about certain things, like we'll study together on face time, or we'll each write notes that we can share on google docs and add notes to that just to give us an extra tool to study with.

In this study, it was evident that most participants who developed friendship bonds and camaraderie with individuals in their cohort trusted and relied on each other for motivation, encouragement and academic assistance during the duration of the program. The close bonds

among participants encouraged and promoted their engagement in their program especially during challenging times when they relied on and motivated each other to persist.

Tinto (2015) asserted that when students regard themselves as a member of a class community who appreciates them and values their involvement, a bond is formed. Communities may also consist of smaller groups which may have similar interests or larger groups. When students experience challenges, the bond they share takes the form of a commitment which binds them together (Tinto, 1987). Cohort members who develop a camaraderie with an individual or a group of fellow students support and motivate each other to expend the effort to persist and excel (Bratlien et al., 1992).

Tinto (2012) discussed the benefits of collaborative learning by describing how instructors are changing the pedagogical methods when teaching the curriculum and using cooperative and problem-based learning in which students work collaboratively in groups with their peers. Through collaborative learning, students are involved socially and intellectually, which will foster their learning and social development and in other ways when groups learn together. Similarly, Petress (2004) agreed that study groups outside of college can enhance student performance, improve their communication skills with others, increase their confidence, and improve their cognizance about diversity.

Research Question 3

What are the experiences of sonography students during clinical rotations at the clinical healthcare educational affiliates and does it foster engagement and persistence in the AS (DMS) program?

Theme 5. Clinical Learning Environment Created by Practitioners

Most participants discussed how the clinical education environment created by clinical instructor and /or sonographer practitioners was/or was not conducive to learning and engagement.

Negative attitudes by the clinical instructor or sonographers who were not very welcoming, friendly, or who were disinterested in teaching and training students resulted in mental and psychological stressors and apprehension among students. Conversely, ultrasound department at clinical affiliate sites who were invested in students by welcoming and being invested in them enhanced their confidence, scanning skills, and enthusiam to be more engaged.

Table 8 below reflects the Themes, Codes and Quotes which emerged to answer Research Question 3.

Table 8

Research Question 3. Themes, Codes and Quotes

Research Question (RQ)	Themes	Codes and Quotes
3. What are the experiences of sonography students during clinical education rotations at the clinical healthcare educational affiliates and does it foster engagement and persistence in the AS (DMS) program?	5. Clinical environment created by practitioners	Friendly Disparaging Hate teaching Unwelcoming welcoming Ignored us Disinterested Invested in us Negative Sense of belonging Refused to help Cynical Nervous kind
	6. Clinical learning and image acquisition training and feedback	They showed me tricks and gave me tips about scanning Took me out of my comfort zone Taught me exams I had never done before Excellent teaching New imaging techniques Patient care Took my hands and guided me

Table 8 continued

		Did not show me anything Discuss scan exams with radiologist. I had to wing it myself. Many pathologies I was able to scan a lot Fast-paced, busy, not much scan time Could not complete my competencies Every chance I got I scanned Learned a lot Patients let me scan Let me do full exams on my own

This construct was also prevalent during interviews with study participants who described clinical environments in which they felt welcomed, appreciated, and where sonographers were very invested in their learning. In contrast, participants also shared experiences in clinical environments where sonographers exuded negative attitudes by ignoring students, and by refusing to teach or train them in patient care, anatomy or improved scanning techniques.

A common view from participants was that clinical instructors and sonographers employed at different clinical affiliate facilities either exhibited negative, unfriendly and unwelcoming demeanors or were positive, welcoming, and invested in student learning.

Kristen described her positive and negative experiences during interactions with two sonographers tasked at instructing and teaching her the clinical facility. Kristen shared:

> It wasn't bad but it was not the best either. Friendly, not that much. After helping me find the Common bile duct I thanked my clinical instructor for helping me. She looked at me and answered, "you know, I hate teaching". She also told me that if she had the opportunity to do things over, she would not enroll in the sonography program because ultrasound is hard on her back. She was so negative and cynical.

Alia explained that clinical instructors and sonographers at the clinical site resented having students. It was evident in their unwelcoming, disinterested attitudes and contemptuous way they addressed students and behaved. She explained:

> They did not make us feel welcome at all. I and two students from a different college who were also there for their clinicals would not be in the office with them, but they did not talk to us. They did not teach me anything. I thought well I will just mind my own business. The lead sonographer did not really want to talk to me or help me at all. I did not like it there, I just wanted to leave.

Meghan explained that some sonographers were more critical than others and provided preferential treatment to a fellow student who was placed with her at the same clinical affiliate site. She noted:

> Some sonographers were more critical than others. I did think that I was being targeted a little. There was one other classmate that went to the same clinical site as me. We would alternate and never worked together. One week I was at the hospital, the other week I was at the womans' clinic on other side. Her experience was vastly different to mine.

Kelly described the demeanor of sonographers at her clinical site as being aloof at first but becoming more supportive: She shared:

> It started out a little rough. They are very strict at the clinic I went to, and they are not quick to make friends with the students. Even although they did not have the warmest personalities, yet they were very supportive.

Students enter the new, overwhelming environment of the clinical affiliate institution to gain clinical experiences that will prepare them for the workforce after graduation. The demeanor by those who are tasked to instruct students can either contribute toward positive learning

experiences that can promote their engagement at the site or negative learning experiences which may result in impeding student involvement.

Many participants described negative learning, interactive experiences with clinical instructors and sonographers who did not hide their disdain at having to train and instruct students and who refused to invest in their learning. Participants described feeling unwelcome, experiencing a lack of self-confidence and apprehension about scanning, and a reticence to request scan time for fear of being criticized. This impeded their motivation to participate in scanning, learning, and other activities at the clinical site. To some students however, the clinical environment may be too overwhelming which may induce an apprehension and reluctance to perform their mandated scanning tasks and other duties (Orygen, 2017).

One participant in her fourth semester explained that she dropped out of the program as the result of negative interactions with a clinical instructor during one of her clinical rotations. Conversely, other participants talked about instructors who were more welcoming, friendly, and invested in them which boosted their self-confidence and fostered their engagement in clinical activities at their clinical institution.

Theme 6. Clinical Learning and Image acquisition Training and Feedback

Study participants described their learning experiences at clinical education facilities where clinical instructors and sonographers either invested in their learning or not. For students who went to sites where a clinical instructor or sonographer practitioners instructed them, and provided them with plenty of time to practice hands-on imaging skills, protocols to complete their competency lists, pathologies, and other strategies for effective learning and preparation for the workforce, clinical education was effective. For the many participants who were not provided with the same curtesy, clinical education was ineffective.

Kristen explained that a locum tenens (Floater) sonographer who was there on a temporary basis was invested in her and taught her to use helpful scanning techniques to improve her imaging skills. She explained:

> After returning to the clinical site on a different day they had a pool sonographer (floater). She took the time to show me different things and shared some of her scanning tricks and tips with me, giving me something to work with you know.

Kelly was elated at the excellent learning experiences the clinical instructor and sonographers on staff provided her with. She described her appreciation at being pushed out of her comfort zone to attempt to scan vascular studies and protocols she had not attempted before, and the opportunity to present her studies to radiologists who read and diagnose ultrasound exams. She shared:

> They pushed me way out of my comfort zone. A sonographer, who had graduated from my college, told me to give of the Emergency Room (ER) doctors a preliminary report on what we found. I was scared to death, but she went with me, and we basically told the doctor that we didn't find a DVT (Deep Vein Thrombosis). That was way out of my comfort zone and I'm glad she did it.
>
> Anytime I followed a particular sonographer to do an exam and they decided that we needed to go to the radiologist about something, they would let me follow and they would let me listen to the interaction between them and the radiologist. It was excellent, just a great learning environment there.

Meghan appreciated the training and education she received from sonographers who were employed at her clinical facility however, she was also frustrated by the frequent non-constructive critiques she received on her work. She explained:

> There were sonographers that showed and explained things to me, they critiqued me in a non-constructive way.

Alia discussed the fast- paced environment at the clinical affiliate that did not leave much time for sonographers to focus on student training and education. Sonographers were also not invested in student education and training which hampered their learning and involvement and resulted in poor learning experiences.

> It was hard to ask sonographers to help you scan because half the time they would be with patients because they were quick. You literally had to catch them before they left the room. So, they did not help me, I was just winging it? There were many pathologies.

For optimal learning, study participants acknowledged that independent practice in which they could perfect their imaging skills, gain self-confidence, and learn from their successes and failures were imperative. They described various contexts at the clinical affiliate sites which allowed for independent imaging practice, or which where fast-paced, heavy workload of practitioners almost made it impossible to receive and scanning opportunities.

Kelly described her clinical learning experiences at the clinical institutions as being excellent as she had many opportunities for independent practice to sharpen her imaging skills and learn from sonographers who instructed and guided her. She explained:

> They made me scan a lot and they wanted me to scan alone, so I did. Doing my checkoffs given by my school to fulfill was no issue, because I got so much scan time and plenty of time to get it done. I also repeated a few exams that needed to be repeated. They are very strict with their grading, but it was a good experience. I felt like they were very invested in the students.

Unlike Kelly, Meghan shared her frustration at not been given more opportunities to practice when scanning opportunities presented itself in the sonography department. She shared:

> So, there were times when understandably you just I did not get much scan time because they were busy, but there are also times when I could have had more scan time, but it wasn't happening.

Alia explained that despite the unfriendly, unwelcoming environment of the sonography department at the clinical affiliate institution. She stated:

> I got to scan quite frequently?

Clinical training for sonography programs is pivotal to student education as it acts as a link between didactic learning in the classroom, clinical scanning practice in the scan lab, and clinical training and learning experiences in a clinical workplace environment. According to Standards and Guidelines by CAAHEP (2022) "A clinical instructor shall be available to students whenever he or she is assigned to a clinical setting, provide appropriate clinical supervision, and be responsible for student clinical evaluation." (p. 4). When clinical instructors and practitioners do not provide sonography students with valuable clinical training and learning as mandated in a contract between the sonography program and clinical affiliate institution, they fail to prepare sonography students for the workplace. Clinical affiliates are also required to "provide each student access to adequate numbers and a variety of types of diagnostic medical examination to develop clinical competency in both normal and abnormal findings for the learning concentrations being offered" (CAAHEP, 2021, p. 4). Study participants discussed the plethora of scanning opportunities they were afforded at certain clinical affiliate institutions and at other busy, and fast-passed institutions they did not receive many opportunities to scan patients. In certain instances, independent imaging was observed by practitioners who critiqued and assisted participants, in others, they did not receive

any training or guidance. Positive interactions with practitioners, patients, and other staff members and learning and scanning experiences at a clinical affiliate institution can be an impetus for student engagement and persistence in the program till graduation and when they enter the sonography workforce.

Chapter 5: Discussions, Conclusions, and Recommendations

Student engagement as a key determinant of achievement of students has been the focus of administrators and scholars over many years (Kahu & Nelson, 2018). A gap in the body of literature regarding sonography student engagement and persistence toward degree completion exists and must be addressed. Therefore, the purpose of this basic qualitative research study is to explore and inform how student learning, engagement, and persistence are fostered in Associate of Science in Diagnostic Medical Sonography AS (DMS) programs, as reflected through student experiences.

In this chapter, I will briefly discuss key study findings derived from chapter four from two perspectives. These include themes and subthemes which either confirm findings in the literature, or which are not found in the literature but have emerged as part of this study. In addition, I will discuss the conclusions, limitations of the study, implications and recommendations for practice and further research. To this end, findings can translate to an increased understanding by program directors, faculty, and other stakeholders of ways in which student engagement and persistence can be promoted in sonography programs.

Themes that Corroborate the Literature

Three themes with accompanying subthemes emerged from participant responses during interviews and corroborates previous findings in the literature. Themes included: Faculty and student interactions during academic instruction and learning, Student Involvement in learning, and Social and Learning Experiences with Peers in the Classroom.

Theme 1. Faculty and Student Interactions during Academic Instruction

Faculty and student interactions during academic instruction was one of the major themes that emerged during interviews with participants who described their engagement and persistence through the prism of their learning experiences in AS(DMS) programs. Additionally, notable sub-themes which emerged, and which will be discussed are, Faculty demeanor, Effective and ineffective instructional techniques, and Assessment and feedback.

Teacher Centered Instruction

Study findings that confirm previous findings in the literature indicate that faculty demeanor during academic instruction in the classroom plays a key role in student learning and their engagement and persistence until completion. For instance, faculty for participants in their fourth semester consisted of two instructors. The first instructor was described as easy going, approachable, understanding and supportive despite being disorganized in her presentations and at times lacking effective pedagogical skills and methods. Participants, though frustrated at times, overlooked her pedagogical shortcomings because her positive, supportive, and encouraging demeanor was an impetus for them to be more diligent and expend effort to learn the content. Conversely, their second instructor was described as stern, inflexible, regimented and sarcastic but also identified as a very good instructor with exceptional pedagogical skills. While a few participants were reticent to participate during classroom instruction for fear of being embarrassed by their instructor if they provided an incorrect answer or said the wrong thing, the majority described not being affected by her attitude and behavior. This is because they recognized that she was supportive and fostered their learning and engagement through what they perceived to be encouragement in the form of "tough love". The two instructors were described as providing a

good balance of personalities in the program. For participants in their third year, interactive experiences with their instructor were often frustrating and stressful. These emotions were often precipitated by their instructor's negative, dismissive, sarcastic, and unsupportive attitude in their learning and progress which did not promote their learning and engagement in program activities. These findings were corroborated in the literature by Tinto (2015), who asserted that students are influenced by individuals in the classrooms, especially faculty. Also, Tolian et al. (2016), as cited in Tinto (2015) proposed that students' self -confidence and self-efficacy is influenced by attitudes and values of others in the classroom, especially faculty. Findings which indicate positive and negative emotional and psychological effects that faculty demeanor has on third- and fourth-semester participants are in line with Pekrun and Schutz (2007) who proposed that student interactions with teachers can contribute toward healthy emotions and attitudes which contributes to effective learning when they are emotionally supported by educators. This is confirmed by Witt et al. (2010) who found that classroom outcomes including student motivation, satisfaction, and learning can be positively associated with immediacy. It is incumbent on administrators and AS (DMS) program directors through regular class visits, and faculty training and development programs to ensure that faculty exude professional, positive, and supportive demeanor in classrooms to enhance the learning process.

Findings derived from interviews with participants in their third semester also revealed how the passive teaching technique of their instructor failed to provide students with effective learning experiences. Their classroom instruction consisted primarily of participants passively following along in their texts while their instructor read course content from a sonography registry review book, pausing only to show images and sharing anecdotes of her experiences as a sonographer in the healthcare workplace. Sparse opportunities were provided for interactive

learning experiences often resulting in boredom, daydreaming, and lack of interest. This, together with their instructor's lack of complete mastery of content knowledge, inability to effectively impart content knowledge and answer pertinent questions on the content, failed to promote their learning and desire to participate. These findings were in line with findings by Tinto (2015) who asserted that classroom pedagogical applications and methods, attitudes and values of faculty shape how students engage in learning.

Findings from interviews with participants in their fourth semester indicated that both of their instructors had different pedagogical techniques and methods. One instructor was described as exuding nervousness when she stood in front of the class, talking too fast during instruction, not having a complete mastery of the content, being disorganized and lacking structure during her lectures. Repeated requests to slow down during instruction, to repeat facts, and frequent disruptions of attempts to locate answers to student questions in the textbook because she was unable to provide an answer hindered participant's learning. Conversely, the other instructor was described as using effective pedagogical skills and approaches and being very nuanced in imparting the content knowledge which she tailored to different learning styles of students through simple and succinct explanations thus promoting effective learning. These findings confirmed previous findings by Murphy et al. (2018) who suggested that instructors who implement a variety of pedagogical methods, for example, class lectures, collaborative learning activities, discussions, student class presentations, lab demonstrations, and occasional quizzes will enhance student learning.

Additionally, Tinto (2012) explained that although talented college and university faculty who contribute their skills to students do exist, however "college and university staff are not generally speaking, trained in pedagogy, curriculum, and assessment in ways that would enable

them to be more effective in promoting the success of their students in the classrooms they teach" (p. 7).

This study emphasizes the need for all faculty in AS (DMS) programs to receive regular professional development training sessions in pedagogy, curriculum, and assessment so that effective pedagogical strategies and methods can be implemented for optimal student learning. Additionally, regular supervisory visits during faculty instruction by program directors or administrators can identify faculty who may require intervention through additional training in instructional skills and methods.

The importance of effective learner centered assessments and feedback was described as being pivotal to their learning and engagement, as persistence in the program was inextricably linked to it. Respondents acknowledged the importance of formative assessments in the form of quizzes, and weekly class tests, and summative assessment through midterms to allow themselves and instructors to gauge their learning progress and for instructors to provide appropriate intervention

They also acknowledged that class tests tailored to certain types and methods of questions during board registry exams improved their learning and prepared them for their formal registration exams. These findings corroborate the literature on student assessments by Tinto (2012), who suggested that assessments were inextricably linked with learning skills and student performance as a gauge to their progress, engagement with their academics, and persistence at college.

Interim and formative assessments designed by the instructor of third-semester participants were deemed ineffective and stressful at times because assessments in the form of class tests and quizzes were hurriedly and poorly planned, often resulting in confusion, incorrect answers and low

grades. Types of questions including multiple choice, matching questions with answers, and labelling of diagrams were identified as often containing incorrect answers, missing information, incorrect spelling, and confused sentences. Also, content not previously discussed during class instruction or prescribed as reading material in textbooks were also selected as questions which exasperated participants. Grades and feedback were also often regarded by participants as being unfair, confusing, and incorrect, based on course content in textbooks. These findings corroborate the literature as indicated by Dai et al. (2021) who suggested that to determine credibility in healthcare education, faculty must foster a healthy relationship between them and students. Additionally, faculty must recognize that students view and accept assessment feedback in an individual way, and that by understanding student goals, interests, and motivations, faculty can determine how they will view the relevance and meaningfulness of the feedback, irrespective of the program culture.

Feedback sessions often resulted in conflicts between the instructor and most participants in their third semester. This as participants experienced frustration after receiving their grades which were often lower than what they expected it to be. Attempts at pointing out errors in test questions and answers to tests that were graded as incorrect when they were in fact correct, were frequently met with resistance and intransigence by their instructor which led to tension in the classroom. These findings are also in line with Kuca (2012), who recognized that student expectations of feedback were for it to occur in a timely manner, focused on them personally, and that it had to improve their learning. Instructors at times experienced challenges with providing learner-centered feedback and justifying a given grade.

Recognizing the issues with institutions or academic programs who limit student assessments to only formative ones, Tinto (2012) suggested that a variety of assessment methods

should be implemented to monitor and assess student learning. This advice could be heeded by AS (DMS) programs which primarily implement interim and formative assessments. Other methods of assessments which could increase critical thinking skills and clinical reasoning skills instead of memorization for the sake of regurgitating facts could be more beneficial for student learning. For instance, spontaneous oral questions in a relaxed atmosphere during a scan lab session may be more beneficial to students who suffer from debilitating test taking anxiety in a formal examination room. Faculty in AS (DMS) programs must attempt to implement feedback methods that are supportive of student learning through collaborative, respectful interactions and discussions that will positively affect student learning.

Theme 2. Student Involvement in Learning

The theme 'Student Involvement in Learning' emerged during interviews with participants who acknowledged that to be successful in AS (DMS) programs, effort, diligence, and self-efficacy were required. The only one notable subtheme that emerged from theme two was student 'Effort and Self-Efficacy'.

Self-Efficacy and Effort

This study corroborated the literature regarding the key role that self-efficacy and effort plays in student engagement and persistence as students take ownership of their own learning.

Findings from this study included participant experiences that revealed the times when they recognized that they had to take responsibility and ownership of their own learning in the AS (DMS) program. For participants, the catalyst to attain good grades and remain engaged and persistent in their rigorous AS (DMS) program, required a belief in their capacity and ability to gain success in the program through determination, tenacity, and diligence despite challenges. These findings were in line with Pascarella and Terenzi (2005) who found that "the impact of

college is largely determined by individual effort and involvement in the academic, interpersonal, and extracurricular offerings on campus" (p. 62).

The most trying and challenging period during the AS (DMS) program was identified by all participants as the period during the COVID-19 pandemic. They described the plethora of changes which occurred in their personal lives, work, and academic lives and how despite the stress they were experiencing they obtained the inner strength to remain tenacious, diligent, resilient and persistent in the program to achieve their goal. These findings align with assertions by Tinto (2017) that students' self-efficacy does not just pertain to their academics, but can also reflect inner drive and belief that they can overcome challenges and other tasks, including attending college while managing other responsibilities. He added that students will expend the effort to persist even when faced with obstacles or hurdles if they really want to and that motivation will be the impetus for them to do so.

The challenges that participants experienced with virtual online Physics instruction taught by an adjunct instructor who had no previous teaching experience were discussed by fourth-semester participants in the context of self-efficacy and effort. They described how during the online Physics lesson they completed calculations using various formulas were provided on prepared slides without the instructor taking the time to explain each step of the calculation to them, which is typical of Physics instruction. She also often failed to impart facts succinctly and slowly resulting in poor understanding and learning experiences. Many pertinent questions by students pertaining to content were either unclear or hurriedly explained. The desperation and fear of failing Physics prompted participants to devise ways to teach themselves and learn the content by watching online videos of Physics lectures by other professors. These findings are in line with Austin (1987) who suggested that the higher the student invests in their learning activities, that is,

the more effort they exert in their learning, the more they learn. Soria et al. (2017) also confirmed these findings by asserting that enhanced self-efficacy is the impetus for students to feel ready and be able to achieve any assignment or task at college, so that by achieving an excellent outcome their persistence and graduation rate will increase. This was also confirmed by Tinto (1997), who suggested that "the greater the students' involvement in the life of the college, especially its academic life, the greater their acquisition of knowledge and development skills" (p. 600).

Findings Contributing to the Literature

Three themes with accompanying subthemes emerged from participant responses during interviews are not found in the literature but have emerged as part of this study, Issues during Ultrasound Scanning, and Navigating Alternative Forms of Learning.

Theme 3. Challenging Experiences during Learning Activities

Study findings related to challenging learning experiences of participants who attempted to master rigorous academic courses while navigating the AS (DMS) program curriculum are discussed in the context of their interactions with faculty, fellow students, and their own efforts.

Study findings indicate that the AS (DMS) program curriculum consists of rigorous and demanding academic coursework which requires higher-order cognitive skills and diligence to master. Among the more challenging courses in the AS (DMS) program curriculum identified by participants are Circulatory (Vascular Sonography), Sonography Physics, Obstetrics and Gynecology, and Scan lab (sonography imaging training). Responses from interviews indicated that the degree of difficulty of specific courses were subjective and depended on the perceived competence, self-efficacy, and motivation of participants. In addition, various course content learning challenges included: The complexity of the content which is intrinsic to different sonography courses; The unfamiliarity of students with the content, and; The lack of sufficient

knowledge of the course/s being taught by instructors who were unable to effectively impart the subject matter and answer pertinent student questions on the content.

Sonography (ultrasound) Physics was described as the most challenging course in their curriculum by the majority of third- and fourth -semester participants. They explained that to master physics they had to possess the acumen to employ a variety of different representations which includes formulas, calculations, and key concepts simultaneously. Several issues which exacerbated the difficulty of learning and studying the Physics content, and which made participants more reticent to engage during class instruction included: The ineffectiveness of physics instruction due to the lack of content knowledge by the instructor of third-semester participants. This resulted in her inability to effectively impart the content and answer pertinent questions posed by them; Ultrasound Physics for fourth-semester participants was complicated by the rapid changes and unpreparedness of college lockdowns and the transition to virtual online learning during the COVID-19 pandemic. The synchronous online instruction of Ultrasound Physics by a novice adjunct instructor who had no previous teaching experience exascerbated the difficulty in learning the subject. Despite having a mastery of the content knowledge, the adjunct had limited pedagogical skills and was unable to effectively impart the Physics content to participants. In addition, applied formulas and calculations were explained on prepared slides without the step-by-step explanations from the instructor as is typical in Physics classes taught in-person on a blackboard in class. They suggested that their instructor could have utilized specific interactive tools provided by Canvas, Zoom, Teams and other platforms to perform calculations in real time. This would have allowed them to follow along, request that she repeat steps during calculations, or pose questions to enhance their understanding.

A few participants described how desperation and apprehension of failing the course catalyzed them to take ownership of their learning after deciding to disengage from their ineffective instructor/s. They searched for additional Ultrasound Physics texts and watched Utube videos of Ultrasound Physics to enhance their understand and learning of course content. These actions underscored the key role that a high self-efficacy and determination play during student learning strategies, their engagement, and persistence to succeed despite obstacles.

To ensure optimal learning and engagement of students in sonography coursework, faculty tasked to teach these courses must have complete mastery of the course content and the instructional skills required to effectively impart content knowledge to students. Administrators and sonography directors who identify instructional issues must intervene accordingly to support student learning and engagement.

Findings reveal that many participants had difficulty understanding the practical ultrasound imaging component of the curriculum during Scan Lab at college. AS (DMS) programs include college sonography lab imaging training sessions (Scan Lab) as a valuable part of the curriculum because it provides hands-on learning experience. During these sessions, students receive instruction and practical ultrasound training by their lab instructor regarding sonographic imaging skills, techniques, and specific anatomic protocols. These Scan Lab sessions are invaluable as sonography students are provided with opportunities for hands-on practice on fellow students or volunteers in a simulated on-campus educational healthcare lab. This enables them to perfect their imaging skills and image acquisition prior to their practical clinical rotations at healthcare affiliate institutions (sites).

In the first month of the first semester, participants were introduced to the sonography equipment (machines and transducers) to learn ‘knobology’, which includes learning how to

manipulate ultrasound system controls which includes knobs or buttons. This enables students to obtain optimal images on the ultrasound machine and to gain experience working with the equipment. They explained that they started learning their sonography protocols (a number and sequence of images that must be acquired for a certain type of ultrasound exam) prior to the mandated college lockdowns as a result of the COVID-19 pandemic. Emotions of frustration, and apprehension about being dismissed from the AS (DMS) program because they did not complete the mandated Scan Lab time and standards and the academic schedule were noted. A participant who was admitted to the program the previous year, failed her practical Scan Lab class and returned to the program after nine months to redo the third- semester with a new cohort. She shared that insufficient time and ultrasound equipment which included seven machines and transducers were allocated for ultrasound imaging (scanning) practice during class lab. This resulted in insufficient access to equipment and practice time for students out in a class of twenty. Inoperable equipment that required repair exacerbated the situation.

After returning to college five months after the college lockdowns to resume their didactic and scan lab sessions, students received additional scheduled time for Scan Lab during college hours, after college classes, and on non-college days to make up for time lost during the COVID - 19 pandemic. For most participants, this additional ultrasound Scan time increased their learning, ultrasound imaging skills and motivated them to be more engaged in perfecting their skills during Scan lab class. For others, the additional time allocated to make up for time lost was not sufficient as they needed more ultrasound training to be adequately prepared for their clinical rotations at the clinical affiliate institutions. This required more effort on their part to come into campus over their weekends off to learn and practice till they felt they were ready.

Most participants also talked about missing the in-person interaction with faculty, and the camaraderie and bonds of their fellow students in the class with whom they created an academic identity as a part of a learning community with whom they could discuss coursework and study. This confirmed the findings by Son et al. (2020) who asserted that many students had difficulty concentrating on their college work due to various distractions, lack of interactions, and hours spent staring at a computer screen.

Many sonography courses which some students find difficult to learn during in-person classroom instruction, including Physics which requires step by step calculations, or ultrasound skill development which requires hands-on demonstrations or simulations, presented learning challenges to students in an online environment.

Other obstacles to effective online learning were described as the various distractions inside the house with other family members present, and outside noises and chatting which drew their attention away during instruction and negatively impacting the learning of their subject matter. Additional barriers to learning were the need to learn new technologies by participants who were not technologically and computer literate, disruptions in video conferencing media because of system overload, and the inability for participants to ask questions spontaneously in the online environment. These findings were corroborated in the literature by Suryaman et al. (2020), who asserted that students experienced many hurdles and barriers during on-line learning at home, including the inability to master technology, the high cost of the internet, and limited social engagement among class members.

Theme 4. Social and Learning Experiences with Peers in the Classroom

The theme 'Social and Learning Experiences with Peers in the Classroom', emerged during interviews with participants about their interactive experiences with their cohort in the AS(DMS) program which reflected if engagement and persistence was fostered or not.

Bonding and Collaborative Learning

During interviews, participants mentioned that they formed strong bonds with members of their cohort after building strong friendships. The formation of strong friendships, and chat- and study-groups with fellow students provided participants with academic and personal support and assistance to persist in the program. A support network was created which enabled them to work collaboratively with each other to master the rigorous academic coursework and other challenges and stressors they all experienced in the program. This was invaluable to many participants who did not derive much support from faculty or family during challenging and stressful times in the AS (DMS) program. Participants who were unable to participate in social and college activities after college hours due of time constraints resulting from part-time employment, or personal responsibilities which included taking care of dependents benefitted from social interaction at college. These findings are corroborated by Tinto (2005), who proposed that the classroom may be the only place where many students who commute to college can meet with their cohort and faculty members. If students do not interact and become involved with each other and their faculty, engagement will most probably not occur. These findings were in line with Hurst et al. (2013) who found that student social involvement with their cohort has been reported as an integral to student learning, engagement, and group cohesion. It was also supported by Jorgenson, et al. (2018) who asserted that an important correlation exists between increased student persistence and social engagement, which leads to a sense of affiliation with their fellow students.

The formation of chat and study groups which enabled students to work together collaboratively by honing and blending their different skill sets proved to be invaluable. By working together, participants learned how to think creatively, improve their communication skills, refine their understanding of rigorous subject matter in a deeper way, and improve their study skills. These findings were in line with Hurst et al. (2013) who found that student social involvement with their cohort has been reported as integral to student learning, engagement, and group cohesion. It was also supported by Jorgenson, et al. (2018) who asserted that an important correlation exists between increased student persistence and social engagement, which leads to a sense of affiliation with their fellow student.

To ameliorate feelings of stress, solace, and depression in the aftermath of the COVID-19 pandemic, social interactions with peers via social media and video conferencing apps such as TEAMS, ZOOM, and others proved to be invaluable during college lockdowns for in-person instruction and students could meet This is in line with Islam et al. (2020) who suggested that the significance of social media has increased exponentially as connectivity and opportunities for collaboration among individuals who use social media has been enhanced.

Study findings reveal that participants in AS (DMS) programs experienced mental health issues, learning, and engagement challenges which resulted from the rapid transition of in-person to online learning when colleges closed during the novel COVID-19 pandemic. Participants explained that online virtual learning during college shutdowns started in March 2020 and ended in July, 2020 when colleges reopened for in-person classes. Many participants described being unprepared for synchronous learning in an online environment were unfamiliar to them which resulted in stress, a concern that the syllabus would change, and that their grades would be adversely impacted. These findings were supported by Carolan, et al. (2020), who asserted that

students and faculty experienced issues with the sudden change to remote instruction. A few participants admitted that they welcomed the change to e-learning because of the flexibility and time it afforded them to stay home and focus on learning and studying instead of expending time and effort by commuting to campus. For other participants however, learning and concentrating on their academics at home during synchronous online instruction sessions was often ineffective as feelings of isolation and boredom during prolonged attention to a computer staring at "faces on a screen" suppressed their desire to learn. These findings were in line with Shoukat (2019) who asserted that many students were somewhat affected psychologically and emotionally by the social isolation they experienced as a result of physical distancing and quarantine precautions during the COVID-19 pandemic.

Theme 5. Clinical Learning Environment Created by Practitioners

Findings pertaining to 'Clinical Learning Environment Created by Practitioners' and student experiences at clinical affiliate institutions during AS (DMS) during student rotations emerged during interviews as is not corroborated by the literature. Subthemes which emerged from the main theme and will be discussed are 'practitioners' demeanor'.

Findings indicated that the initial transition from the college classroom to the clinical affiliate institution environment was overwhelming and stressful as they attempted to navigate the unfamiliar environment of the sonography workplace. This, together with unfriendly, negative attitudes and behaviors from clinical instructors and practitioners at certain clinical affiliate sites exacerbated the stress.

Challenges experienced at clinical sites were varied. They included misplaced expectations from practitioners who expected participants' performance level of hands-on ultrasound skills and knowledge about all ultrasound image acquisition and anatomical protocols and knowledge should

be of a much higher caliber than what students were demonstrating. Explanations about the loss of months of sonography training during scan time caused by the COVID-19 pandemic were accepted by some practitioners but fell on deaf ears by others. Many empathetic participants correlated practitioners' attitudes and behaviors with the stress they were experiencing due to their heavy workloads in fast-paced workplace environments, especially during the Covid-19 pandemic. They perceived that the additional responsibilities of mentoring, training, and teaching students added to practitioners' fragile emotional and psychological states and their workplace burnout was often transferred to sonography students who they perceived as adding to their workload. For participants, the need for clinical coordinators in the program to visit clinical sites regularly and inform clinical instructors and practitioners about Scan Lab schedules and hands-on imaging activities in the program will eliminate misplaced expectations by practitioners.

Study findings indicate that participants expressed both positive and negative emotions about their participation activities at clinical affiliate institutions. A few participants described enjoying positive experiences while interacting with practitioners who were supportive, motivating, encouraging and who were invested in their learning. Most participants however, described negative experiences during their interaction with practitioners at a few clinical affiliate institutions. They described how a few sonography practitioners at different clinical facilities did not hide their disdain at having to teach and train them and openly verbalized their frustration about their responsibility to participants. Other practitioners tried to persuade students that they were not good candidates for the sonography career field and spoke disparagingly about sonography as a career field. One participant described crying in the car during lunch time at the clinical affiliate site after being excoriated by a practitioner for her suboptimal imaging skills, and interpretation of findings after performing an exam on a patient.

Another participant described being ignored by practitioners, forced to stand against a wall outside an exam room while a practitioner was performing ultrasound exams. She described having reservations about scanning even though she was required to request opportunities to scan during patient visits, so that she could complete her mandated clinical sonography competency scan list. Her reticence to participate in clinical activities was precipitated by previous negative experiences at clinical site where she was criticized about images instead of receiving constructive critique that could enhance her learning and scanning skills. A few participants described the overall hostile climate in some sonography departments where practitioners would continuously gossip about coworkers, colleagues, patients, and participants from other colleges. These negative behaviors and attitudes by practitioners were described by participants as failing to promote their learning and engagement in clinical activities but instead caused apprehension, lack of motivation, and even doubts of persisting in the program and pursuing a career in sonography.

Theme 6. Clinical Learning and Image Acquisition Training and Feedback

When participants were asked about clinical learning, training, and scanning opportunities during clinical rotations of sonography students at clinical affiliate institutions emerged during interviews.

When asked to discuss the extent to which teaching and training provided by sonography practitioners were effective, adequate, positive, supportive, and fostered their participation in performing patient ultrasound exams and other clinical activities, participants' answers were mixed. For many participants, clinical instructors and practitioners who were invested in their learning provided adequate, optimal teaching and ultrasound training and scanning opportunities before, during, or after completing their patient ultrasound exams despite the hectic, fast-paced work environment at hospitals and outpatient centers. They encouraged and motivated participants

to do new and more difficult tests beyond what they thought they were able to do, to enhance their self-confidence and self-efficacy which fostered participant engagement in the clinical workforce and persistence in the program.

For participants who were placed at certain busy, fast-paced clinical affiliate institutions where clinical instructors and sonography practitioners were disinterested about investing in student learning and training, independent and supervised scanning opportunities were infrequent. Additionally, participants were also often unable to complete mandated competency forms which served as proof that they had performed certain exam protocols, identified and imaged soft tissue organs, and completed certain clinical tasks satisfactorily. These forms were provided by the AS (DMS) program for evaluation by clinical instructors or practitioners for evaluation with a assigned grade for student performance. They also faced criticism about incorrect scanning techniques, protocols, and other clinical tasks. This negative environment often led to loss of confidence, reticence to participate in clinical activities, apprehension and fear of failure due to poor clinical progress reports. Participants who received constructive critique with effective clinical training and teaching to assist students with improved scanning techniques, and other clinical related guidance fostered learning and involvement in clinical activities. Findings indicated a correlation between practitioners' demeanor and the effectiveness and quality of the training and teaching of students at clinical institutions.

Conclusions

I was very surprised by many students who described unwelcoming and unfriendly clinical education environments and negative attitudes, and reticence of clinical educators and sonographers at a few clinical affilates to train students. Sonographers are professionals who work with the public, not only to scan patients to assist radiologists in the diagnosis of pathologies but

to provide, support, kindness, empathy, and an understanding to patients who may be afraid, concerned, or stressed about the outcome of the ultrasound. This ultruistic, caring, and supportive demeanor should be tranferred to students who enter ultrasound departments at the clinical affiliate sites for vital clinical education. That was what was expected on me at the health care imaging facilities that I worked at. Sonographers should remember that they were once students who relied on the help of clinical instructors and sonographers to teach, train and guide them until they graduated from the program.

While some Associate of Science degree in Diagnostic Medical Sonography (AS (DMS) programs at colleges in Florida have good graduation rates, others have ongoing issues with high attrition rates of students who fail to graduate and enter the workforce (National Center for Education Statistics, 2019). This is problematic for the future of sonography students and the community that needs colleges to prepare and graduate sonographer practitioners to enter the workforce after other practitioners retire or leave the practice. Previous research has determined that student engagement is critical to academic success and must therefore be fostered by faculty (Quinn, 2017). Tinto (1997) asserted that for students to become academically and socially involved or integrated, it must happen in the classroom.

1. Positive and supportive social interactions are needed for student engagement and persistence

Student perspectives indicate that their inspiration to become fully committed to engage in didactic learning and ultrasound imaging training and to persist until AS (DMS) program completion, can be attributed to positive and supportive interactions between them and faculty. They described how faculty who exuded a positive and supportive demeanor and were invested in their progress and success was the catalyst for their motivation to fully engage in their learning

and all program activities and inspired them to persist in the program until graduation. Additionally, positive and supportive social interactions with their fellow students with whom they share similar learning experiences as they navigate the arduous AS (DMS) curriculum, is an impetus to their involvement in all program activities and their persistence to be successful. Students described forming close friendship bonds and chat and study groups with their fellow students as they worked collaboratively, supporting and encouraging each other to be fully involved in their studies and ultrasound scanning and to persist till graduation. Vacca et al. (2011) asserted that learners who are socially interactive are more involved during learning experiences.

2. Student engagement and persistence is determined by the quality of faculty's instruction

Equally critical for the engagement and persistence of students in AS (DMS) programs is the quality of instruction. Students have indicated that when their instructors are fully prepared with their lesson preparation and can effectively impart the course content knowledge to them, they are more motivated to learn and engage during class activities and with their studies after class. They are also more likely to persist in the program. Conversely, participant students described how their learning was stunted, their motivation to engage in didactics and other program activities waned, experienced apprehension about failing, and their achievement and grades suffered when faculty lacked deep content knowledge pedagogical skills.

3. Effective assessment design and feedback is required to reflect on learning and engagement

In rigorous AS (DMS) programs, assessment of curriculum achievement is imperative for faculty to gauge student didactic learning progress and ultrasound imaging skill development to determine if intervention and student assistance is warranted. The perspectives of participant students indicate that effective sonography course assessment design and learner-based feedback by faculty enables them to gauge their learning progress, adjust their study skills and become more

attentive to their coursework and studies. Additionally, they indicated that effective assessment design and learner centered feedback based on ultrasound registry exams, encouraged their engagement in their studies and persistence in the program to prepare for their board registry exams after graduation.

4. Students' ownership of their learning process

Another significant conclusion from the study is sonography students' recognition of thecritical need for them to take ownership of their own learning, through diligence, effort, and a strong sense of self-efficacy despite academic or personal obstacles they may encounter along the way. Sonography students indicated that their need to take the initiative for their own learning was initially precipitated by their instructor's lack of deep content knowledge in certain courses, their inability to effectively impart that knowledge to students, and their failure to answer pertinent questions. Students acknowledged that to be successful in the rigorous sonography program they had to be diligent by remaining fully engaged in their academics, and by relying on their own efforts and abilities to be successful in the program. They recognized that as practitioners in the sonography workforce after graduation they may be presented with various challenges which would require a strong self-efficacy, strength, and determination to persist. Therefore, it is pivotal to their future success, as there is some sense of urgency to embrace the AS (DMS) program as the training field to prepare them for the future.

5. The central role of clinical affiliates is to further student learning and engagement

Sonography students have indicated that clinical instruction in clinical affiliate institutions is particularly critical for their preparation to enter the healthcare workplace. They have revealed the need to have effective instruction in clinical affiliates, which prompts the program administration to implement well-developed partnerships with affiliate sites to support student

learning. Effective learning, engagement, and persistence is only possible in a welcoming, positive, supportive, and effective clinical learning environment. From students' perspective, their clinical learning, engagement in activities, and persistence in the program will be enhanced with clinical affiliate partnerships that have the interests of students as a priority.

Limitations

There are some limitations identified in this study. To begin with respondents were a small sample. The total number of participants selected was eight, although twelve students volunteered to participate in the study. Of the twelve participants, only four students from each college qualified based on specified criteria. This small sample was a limitation as a larger participant pool may have yielded richer data about learning experiences and engagement in the AS (DMS) programs that may have benefitted from the study.

Respondents consisted of eight females but no males. This may be a limitation as findings reflect data on only female student experiences and perspectives about engagement and persistence. Male students may have had different experiences and therefore provided more in-depth information and a different perspective which could have contributed to more insights about learning, engagement, and persistence of male students in AS (DMS) programs. Another limitation is that the study is only two AS (DMS) programs at two colleges in the state of Florida were selected as research sites for the study. More research sites in Florida could have provided a larger context within which to explore the experiences of students within the framework of other programs.

Participants in AS (DMS) programs represent a purposeful sample of students who utilized video conferencing platforms for online learning during COVID-19 lockdowns. The transition to online learning, which many participants were unfamiliar and inexperienced with, did not provide an otherwise regular "normal" context in which to study the experiences of those students. In other

words, were it not for COVID-19, the experiences reflected by participants would probably have been differently reflected in this study. Thus, this represents a limitation.

Implications

Implications for College Administrators, Sonography Program Directors, and Faculty

Study findings can be utilized to enhance the knowledge and understanding of program directors and faculty about student engagement and persistence in AS (DMS) programs so that improved program strategies and pedagogical skills and methods can be implemented. Continuous professional pedagogical training for faculty can be facilitated to improve student learning and engagement. In a study of community college faculty and student retention by Graham (2017), findings showed an increase in research which focuses on pedagogical strategies, data about graduation rates, curriculum design, various models for effective assessment, and higher education institution practices.

Student engagement and persistence and ultimate achievement in AS (DMS) programs must also be the focus of college and program administrators and faculty so that intervention services in the form of tutors, mentors, and other required services can be provided to students at risk of attrition, to assist them to succeed.

The findings of this study can provide administrators (Deans) with an increased knowledge and understanding of sonography student engagement and persistence. By extrapolating relevant data from findings, administrators, program directors, and faculty can determine what students in AS (DMS) programs need to effectively foster their learning, engagement, and ongoing persistence, and thus can take adequate measures for their programs. For example, this can prompt regular evaluation sessions of faculty by program directors to ensure that a positive, thriving, learning environment is created for students through meaningful connections.

Implications for Evaluation of Clinical Affiliate Institutions

Most AS (DMS) participants described having negative experiences during clinical practice rotations at a few selected clinical affiliate institutions that are allocated as teaching sites for students to fulfill their clinical practical training. This is unacceptable as clinical training is pivotal to sonography education, exposing students to situations and diverse experiences in real-world scenarios, and helping them improve their skills, and apply knowledge learned at college. Improved policies, oversight, and evaluation of clinical affiliate institutions by program administrators is imperative to ensure positive and effective clinical experiences for students. Additionally, the selection of clinical affiliate institutions which are invested in the clinical teaching and training of students by ensuring meaningful hands-on ultrasound experiences will contribute to the engagement and persistence of sonography students.

Clinical affiliate institutions sonography department managers and AS (DMS) directors can extrapolate study findings to determine how the clinical institutions can enhance their sonography department environments to provide students with significant and valuable experiences to promote continuous interest in the program.

Recommendations for the Effectiveness of Instructional Practices for Student Learning

Findings indicate that most participants in both AS (DMS) programs encountered learning challenges with certain sonography courses which they attributed to passive instructional methods, and a lack of a deep content knowledge and/or ineffective pedagogical skills of certain instructors. This occurred particularly under non-normal instructional practices due to COVID-19 and the limitations it posed.

Additional research to determine the most effective instructional practices that would foster student learning, is imperative to enhance student engagement and persistence in in AS (DMS)

programs, in contexts that are free of the influences of COVID -19, and that may include a variety of delivery options.

Research comprising of in-class observations of participant and instructor interactions during AS (DMS) course and scanning instruction on campus, followed by in-person interviews after college will allow the researcher to gain a greater perspective of the learning environment of students. This will provide a more robust understanding of academic and social interactions in the sonography program between students and their instructors, which influences student engagement and persistence could be added to this study.

Recommendations for Additional Research

A basic qualitative research study about student engagement and persistence from the lens of AS (DMS) faculty experiences within the classroom environment can be conducted to gain the perspective of faculty. Semi-structured, in-depth interviews with faculty regarding student experiences during sonography didactic instruction and ultrasound imaging training during Scan Lab interactions with students will inform and provide a more holistic perspective on sonography student learning and their engagement. Valuable insights into student learning approaches, their attitudes and behaviors, and student engagement practices with faculty and their cohort in the classroom can be extrapolated from interview findings.

This research study consisted of a small but adequate sample size of eight participants from AS (DMS) programs at two four- year state colleges. A more comprehensive study encompassing multiple AS (DMS) programs at both two-year and four-year state colleges in Florida can be conducted to add to the significance of this study. A larger sample size will increase the phenomenon of interest and yield additional information from which rich and deep data can be extrapolated to increase the transferability of the findings.

A replication study can also be extended to AS (DMS) programs at either two-year or four-year state colleges in other states to compare interview data obtained in other states with data obtained in Florida. A larger sample size will increase the phenomenon of interest and yield additional information from which rich and deep data can be extrapolated to increase the transferability of the findings.

A research study focusing on AS (DMS) student experiences at clinical affiliate sites will provide a prism through which the effectiveness of clinical sonography department environments can be viewed. Clinical education is a critical part in the AS (DMS) program curriculum which requires students to learn pertinent clinical education, and transfer sonography classroom learning and imaging practice at college to real-life scenarios in a clinical workplace environment. An investigation of the clinical environment created for students by clinical instructors and practitioners, clinical instruction, ultrasound imaging skill training, and time allocated for individual and supervised imaging acquisition practice time and opportunities, AS (DMS) program administrators can determine the effectiveness of clinical education at the site. This is imperative as positive or negative experiences at clinical sites can influence student engagement and persistence in the program.

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Appendix A: Informed Consent Form for Major Research Study

Josephine Peck

University of South Florida Committee Members:
Oscar Aliaga Abanto
Jennifer Wolgamuth
Victor Hernandez
Bill Blank,

Project Title:

Exploring Engagement and Persistence through the Lens of Student Experiences in a Sonography Program.

I wish to thank you for your interest in this project. I am Josephine Peck, a PhD candidate at the University of South Florida, and I will be conducting the study under the supervision of Dr. Oscar Aliaga Abanto.

Purpose of the study.

This study is being conducted to explore your experiences in the AS(DMS) program to determine if your experiences encourage or discourage your engagement in your academics, social interactions and at clinical affiliates during clinical rotations.

Description of the research?

When you are invited to participate in a research study, you have the right to know and be informed about the procedures of the study and what will be required of you before you decide to participate and give your consent.

When you volunteer your participation in this study, will be asked to participate in one interview of 60-90 minutes. The interviews will focus on the following:

a) Your experiences in the program and how those experiences encouraged/discouraged your engagement in the Associate of Science in Diagnostic Medical Sonography program (AS(DMS) academics and practical imaging component in class.

b) Your experiences in the program and how those experiences encouraged/discouraged your social engagement with your instructors and cohort in the Associate of Science in Diagnostic Medical Sonography program (AS(DMS).
c) Your experiences in the program and how those experiences encouraged/discouraged your engagement in the clinical environment at the clinical affiliate sites during your clinical rotations,

I will request some of your personal background information such as your age, gender, ethnicity, and grade point average from you or your student file to provide a clearer understanding of you in the context of the information you provide. This information will also be confidential and contain your pseudonym throughout this study.

All questions posed to you during interviews will be open-ended, which means phrased with a statement and I prefer that you answer using a statement as well, instead of yes or no answers. You may relax and take your time to think through all questions before responding to a question. There may be silence at certain times during the interview, as I will be taking notes. Please remember that there are no right or wrong answers. A pseudonym will be ascribed to you to ensure that all your personal and interview information and data is held private and confidential. After the interview, all information you provided during the interview will be manually transcribed (put your thoughts into written form). You will be emailed a copy of the transcript to peruse, to ensure that all information you provided during the interview session and which I extracted from my recordings and notes are accurate. If any information has been misinterpreted or is incorrect, please advise me of that.
If needed, a follow-up interview will be conducted virtually to obtain information about questions I may have overlooked or to clarify or elborate on answers provided in the first interview. You may also add to, change, any answers you previously provided. I will be fully transparent, and all information and data will be kept private and confidential. Your personal and interview information and data will be stored in the virtual cloud with an encrypted password to maintain confidentiality. I will provide my email and telephone number to you so that you can contact me if you have any questions.

Protection of Privacy

Prior to performing my research at the college, I must complete the College Institutional Review Board (IRB) form, also called the ethics review board application. The IRB was established to protect the rights and welfare of individuals (human research subjects) recruited to participate in research activities which are being conducted under their authority. There are therefore policies, rules, and stipulations that researchers need to fulfil during their research projects, with strict adherence to the College IRB.

When you give your consent to participate, you will do so voluntarily and not under coercion or duress. You can refuse to participate when you wish. If you decide to participate and sign the consent to do so, you may withdraw your participation verbally or in writing at any time without being penalized in any way. If you withdraw, I will refrain from using any documentation or information provided by you during the time of your participation. I may also withdraw you from the research study if I believe it is within your best interest, or for another pertient reason.

Confidentiality and anonymity are requirements of the College Institutional Review Board. Thus, all direct references to your college, and your student identity will remain anonymous. Any information provided during the interviews will be confidential. You will select a pseudonym (a fictitious name or alias) to guarantee that you remain anonymous. All documents and transcripts pertaining to you will contain only your pseudonym and none of your private information. The information that you provide will not be used for any other purpose than for this study.

Potential Risks

Participation in this study may not be free from any risks. However, these risks will not induce physical harm, but may cause some psychological risks which may include the production of negative states which may include stress, anxiety, guilt, or feelings of sadness, anger, or loss of self-esteem. You may also be inconvenienced by giving of your time and energy to participate in this study. You may, however, refuse to answer any questions that may cause discomfort and induce those emotions. In addition, as previously mentioned, you may withdraw your participation at any time.

Benefits of Participation

You will receive $50.00 financial compensation for participating in this project which will be disbursed at the end of the study. The information and insights that you provide through the interviews, may provide administrators, program directors, instructors, and other stakeholders at colleges or universities that offer diagnostic medical sonography programs a treasure trove of valuable knowledge and understanding of academic and social engagement of first-year sonography students. Program directors and instructors may also gain a clearer understanding about the influence of engagement on student persistence, which may result in the implementation of effective interventions and policies to support changes in a positive way.

If you have any additional questions or concerns about your participation in this study, please do not hesitate to contact me at writejf@msn.com.

By signing this form, you are indicating that you have read and understand all information provided in this form and that you volunteer your participation in this study. You may withdraw your consent and participation at any time without any penalty. By signing this consent form, you will not be waiving any rights or legal claims. You will be provided with a copy of this consent form.

Signature Date

_____ _____

Appendix B: Informed Consent Form for Pilot Study

Josephine Peck

University of South Florida Committee Members:
Oscar Aliaga Abanto
Jennifer Wolgamuth
Victor Hernandez
Bill Blank,

Project Title:

Exploring Student Engagement and Persistence through the Lens of their Experiences in a Sonography Program.

I wish to thank you for your interest in this project. I am Josephine Peck, a PhD candidate at the University of South Florida, and I will be conducting the study under the supervision of Dr. Aliaga and Dr. Hernandez.

Purpose of the study

This project is being conducted to assess the feasibility of a major qualitative research study's recruitment methods and data collection methods. These methods will be used to understand sonography students' perceptions of their engagement in the sonography program, the college, and at the clinical affiliates, and the influence their engagement has on their persistence.

Description of the research

When you are invited to participate in a research study, you have the right to know and be informed about the procedures of the study and what will be required of you before you decide to participate and give your consent.

When you volunteer your participation in this study, you will be asked to participate in one interview of 60-90 minutes. The interviews will focus on the following:

a. Your experiences in the program and how those experiences encouraged/discouraged your engagement in the Associate of Science in Diagnostic Medical Sonography program (AS(DMS) academics and practical imaging component in class.

b. Your experiences in the program and how those experiences encouraged/discouraged your social engagement with your instructors and cohort in the Associate of Science in Diagnostic Medical Sonography program (AS(DMS).
c. Your experiences in the program and how those experiences encouraged/discouraged your engagement in the clinical environment at the clinical affiliate sites during your clinical rotations,

All questions posed to you during interviews will be open-ended, which means phrased with a statement and I prefer that you answer using a statement as well, instead of yes or no answers. You may relax and take your time to think through all questions before responding to a question. There may be silence at certain times during the interview, as I will be taking notes. Please remember that there are no right or wrong answers. After the interview, all information provided will be transcribed (put your thoughts into written form). You will be emailed a copy, so that you can read through the transcript to ensure that all information and my interpretation of that information extracted from my recordings and notes are accurate. If any information has been misinterpreted or is incorrect, please advise me of that.

If needed, a second interview will be conducted either face-to-face at the college or any public venue per your request or via Skype or Facetime. This interview will be a follow-up interview to the first and will thus review previous interview questions and answers. If you would like to provide me with information you may have overlooked during the first interview you may provide it. You may also change, delete, or elaborate answers previously provided. Also, I may need to clarify some of your previous answers or pose additional questions that I failed to ask in the previous session. All recorded interview data will be transcribed. You will be provided with a copy so that you can read through the transcript to ensure that all information and my interpretation of that information, extracted from my recordings and notes, are accurate. If you come across any words or terms that you do not understand, please ask me for an explanation. If any information has been misinterpreted or is incorrect, please advise me of that. I will be fully transparent, and all information and data will be confidential. I will send my email so that you can contact me when you wish to.

In addition, I may request some of your personal background information such as your age, gender, ethnicity, and grade point average from you or your student file to provide a clearer understanding of you in the context of the integration information you provide. This information will also be confidential and contain your pseudonym throughout this study.

Protection of Privacy

Prior to performing my research at the college, I must complete the College Institutional Review Board (IRB) form, also called the ethics review board application. The IRB was established to protect the rights and welfare of individuals (human research subjects) recruited to participate in research activities which are being conducted under their authority. There are therefore policies, rules, and stipulations that researchers need to fulfil during their research projects, with strict adherence to the College IRB.

When you give your consent to participate, you will do so voluntarily and not under coercion or duress. You can refuse to participate when you wish. If you decide to participate and sign the consent to do so, you may withdraw your participation verbally or in writing at any time without being penalized in any way. If you withdraw, I will refrain from using any documentation

or information provided by you during the time of your participation. I may also withdraw your participation if I believe it is in your best interest, or for another pertinent reason.

Confidentiality and anonymity are requirements of the College Institutional Review Board. Thus, all direct references to your college, and your student identity will remain anonymous. Any information provided during the interviews will be confidential. You will select a pseudonym (a fictitious name or alias) to guarantee that you remain anonymous. All documents and transcripts pertaining to you will contain only your pseudonym and none of your private information. The information that you provide will not be used for any other purpose than for this study. My dissertation committee will have access to the audio recordings and transcriptions of those recordings, however, they too must adhere to the College IRB and maintain your anonymity and confidentiality.

Potential Risks

Participation in this study may not be free from any risks. However, these risks will not induce physical harm, but may cause some psychological risks which may include the production of negative states which may include stress, anxiety, guilt, or feelings of sadness, anger, or loss of self-esteem. You may also be inconvenienced by giving of your time and energy to participate in this study. You may, refuse to answer any questions that may cause discomfort and induce those emotions. In addition, as previously mentioned, you may withdraw your participation at any time.

Benefits of Participation

Participants will receive a $30.00 cash gift certificate as financial compensation for participating in this project. However, the information that you provide through the interviews, may increase students' knowledge of academic and social integration of first-and-second year sonography students and its impact on student persistence till graduation, or attrition (withdrawal) in diagnostic medical sonography programs. This study also has the potential to increase the knowledge and understanding of administrators, program directors, instructors, and other stakeholders at colleges or universities that offer Diagnostic medical sonography programs, and thereby support changes in a positive way.

If you have any additional questions or concerns about your participation in this study, please do not hesitate to contact me at jmoseley@mail.usf.edu.

By signing this form, you are indicating that you have read and understand all information provided in this form and that you volunteer your participation in this study. You may withdraw your consent and participation at any time without any penalty. By signing this consent form, you will not be waiving any rights or legal claims. You will be provided with a copy of this consent form.

Signature Date

_____ _____

Appendix C: Pilot Study Interview Questionnaire

Introduction

- ***Ice breaker and building a rapport with students***
  - Introduce myself to my participants and tell them about my decision to pursue a Ph.D.
  - Attempt to learn more about participants by building a rapport with them and by helping them relax with informal conversation on general matters.
  - A short discussion on the purpose of the research and definition of the terms engagement and persistence will be help prior to the interview.
  - An explanation of the protocol and type of interview. Semi-structured, broad, open-ended questions in the form of a discussion. No yes aor no answers.

- ***Privacy and Confidentiality***

➢ Discussion about IRB requirements to maintain safety of participants by using a pseudonym.

- ***Identifiers***

➢ Not sharing any of their personal information, information provided during interviews transcribed data with unauthorized individuals.

Research question 1

Interviews based on Research Question 1

What are the experiences of sonography students with their faculty during their academic trajectories and do they foster engagement and persistence in the AS (DMS) program?

a) Why did you decide to choose sonography as your career?
b) Did you have sonography program orientation before you started the semester?
   Did you completely understand what the program was about and what was expected of you as a student?
c) How many students started the program in your class in the first semester?
d) How many courses did you do in the first semester?
   Were the courses easy or challenging for you, and what were your grades like in the first semester?
e) How long did it take before you started feeling comfortable or interacting with your instructors and fellow students in the program?

f) Do you work and have family obligations while you are attending college?
g) How do working and family obligations affect your learning and progress at college?
h) Did you ever have doubts about continuing in the sonography program because of challenges in the classroom or in your personal life?
How did you overcome those doubts and continue in the program?
i) Were you becoming more involved with your coursework in class and at home?
j) When did you start making strong connections and socializing more with your instructor and your class members?
k) Which courses have you found the most challenging till now?
If you have, do you feel free to ask your instructor for help?
l) Do you feel confident enough to answer questions posed by your instructor, or to ask questions during class instruction?
m) How many courses do you have in your third semester?
n) How much more time do you spend on studying and doing assignments?
o) Do you complete your assignments on time and have a daily study routine?
How much time did you devote to your studies and assignments daily?
p) Do you catch up on missed lecture material?
q) Do you attend classes regularly or do you have obligations which makes it unable for you to attend college regularly?
r) When did you start practicing your ultrasound scanning?

Research Question 2

Interviews based on Research Question 2

What are the experiences of sonography students with their cohort during social interactions in the classroom and Scan Lab, and does it foster engagement and persistence in the AS (DMS) program?

In this part of the interview, I would like to ask you about the social environment in the class or during virtual Zoom instruction. By social environment I mean how you relate to and interact with class members. I know that you did not have much face-to-face class time at college because of the Covid-19 pandemic, but I would like to know about your experiences in class.

a) Do you feel like you made a connection with your class group, like one of the team?
a) Have you made a good friend or any good friends with any of your classmates known as your cohort?
b) Do you work together in study groups or assignment groups?
c) Do you have one or more students that you can discuss classwork with or study with?

Question 3

Interviews based on Research Question 3

What are the experiences of sonography students during clinical education rotations at the clinical healthcare educational affiliates and does it foster engagement and persistence in the AS (DMS) program?

a) When did you start your clinical rotations and scanning at hospitals and outpatient centers?
a) Do you think that you have sufficient scanning time at college to prepare you to scan during your clinicals at hospitals and outpatient centers.
b) Have the hospitals or outpatient centers welcomed you as a student, been friendly, and helped to teach and improve your scanning skills?
c) Do you feel comfortable asking sonographers and radiologists questions about patient studies and pathologies?
d) Do you feel confident helping sonographers with daily tasks and patients?
e) Do you take the initiative to ask sonographers if you can scan after they have completed working on a patient or do you wait for them to ask you?
f) Are you comfortable doing ultrasound scans on patients and interacting with them?
g) Do sonographers give you sufficient time to practice your sonography scanning protocols and skills when you are at the facility?
h) Are you emotionally or psychologically affected when you see or scan very sick or dying patients?
i) Have you ever had any thoughts about dropping out of the program because of some experiences you had at your clinical site?

I wish to thank you for your time and for providing me with valuable information for my research study. Is there anything you would like to say or add before we conclude our interview session?

If you have any questions or concerns please contact me. I will contact you if I have any folloe-up questions or need clarification with your answers. I will also email your transcribed interviews for your perusal. If you find any errors, discrepancies or misinterpretations of information you have provided, please note that so that I can correct it accordingly.

Appendix D: Major Research Study Interview Questionnaire

Open-ended questions based on the literature review and framed on Tinto's (1993) Student Integration Model were used to elicit rich and thick descriptions from students about their experiences in AS(DMS) programs. These interviews provided a prism through which student academic, social, and clinical engagement and its impact on their persistence could be explored.

Interviews began by attempting to build a rapport with students by helping them relax with informal conversation on general matters. This was suggested by Jacob and Ferguson (2012) who stated that better responses could be elicited by building a rapport with participants. I proceeded with the interview. By using broad, open-ended questions (Jacob & Fergusen, 2012), participants were allowed to talk freely and uninhibited. A short discussion on the purpose of the research and definition of the terms engagement and persistence will be held prior to the interview. The purpose of this research study is to understand how you as a student perceives (recognizes or understands) how involved you are with your learning in the classroom, lab, or clinical site, and to what extent your involvement leads to your success or lack of success in the program.

The meaning of student engagement as used in this study is the level of attention, interest, and passion you focus on your learning while you interact and socialize with others during class instruction (your instructors and class members), outside of the class, at the college (friends and other college members), and at the clinical site (hospital or outpatient center) with sonographers, doctors, patients, and other staff members.

The term goal to persist means staying enrolled in the sonography program on a continual basis no matter what obstacles you experience, till you complete your degree. During interviews, sonography and ultrasound will be used interchangeably?

A discussion about IRB requirements to maintain safety of participants by exercising privacy, and confidentiality was also discussed. Confidentiality of personal and interview data was maintained. Pseudonyms were utilized to mask student names.

Research Question 1

What are the experiences of sonography students with their faculty during their academic trajectories and do they foster engagement and persistence in the AS (DMS) program?

a) Do you think that your instructors are positive and respect and care about you and your progress at college?
b) Do you feel comfortable talking to and being with your instructors?
c) Do you feel safe, accepted, and free to be involved in the classroom and college?
d) Do your instructors use teaching methods and techniques which enriches your academic learning experiences? Why or why not, please explain?
e) Do your instructors make their lectures interactive so that all students can participate or do they use passive teaching techniques?
f) If you have, do you feel free to ask your instructor for help?
g) Do you attend classroom or zoom virtual instruction regularly, or do you skip instruction?
h) How many courses are you doing this semester?
i) How much time do you spend studying and doing assignments daily?
j) Were you becoming more involved with your coursework in class and at home?
k) Which courses have you found the most challenging till now
l) Do you feel confident enough to answer questions posed by your instructor, or to ask questions during class instruction?
m) How much more time do you spend on studying and doing assignments?
n) Do you complete your assignments on time and have a daily study routine?
o) How much time did you devote to your studies and assignments daily?
p) Do you catch up on missed lecture material?
q) Do you attend classes regularly or do you have obligations which makes it unable for you to attend college regularly?
r) When did you start practicing your ultrasound scanning?
s) How many hours of class scanning do you do a week?
t) Do you think that you are doing well or are you struggling to understand or perform your scanning?

u) Are you able to practice your scanning in your free time at college?
v) Do you miss interacting and learning with class groups at college, or are you happier learning from home using the virtual Zoom online format?
w) How did the Covid-19 pandemic change your interaction with your classmates or did you all meet online to study and do your college work?
x) Do you think that you got lower grades because of virtual online instruction or did your grades not change?

Research Question 2

What are the experiences of sonography students with their cohort during social interactions in the classroom and Scan Lab, and does it foster engagement and persistence in the AS (DMS) program?

a) I know that you did not have much face-to-face class time at college because of the Covid-19 pandemic, but I would like to know about your experiences in class.
   Do you feel like you made a connection with your class group, like one of the team?
b) Have you made a good friend or any good friends with any of your classmates known as your cohort?
c) Do you work together in study groups or assignment groups?
   Do you feel safe, accepted, and free to be involved in the classroom and college?
d) How did the Covid-19 pandemic change your interaction with your classmates, or did you all meet online to study and do your college work?
e) Do you miss interacting and learning with class groups at college, or are you happier learning from home using the virtual Zoom online format?

Research Question 3

What are the experiences of sonography students during clinical education rotations at the clinical healthcare educational affiliates and does it foster engagement and persistence in the AS (DMS) program?

a) When did you start your clinical rotations and scanning at hospitals and outpatient centers?
b) Do you think that you have sufficient scanning time at college to prepare you to scan during your clinical at hospitals and outpatient centers?
c) Have the hospitals or outpatient centers welcomed you as a student, been friendly, and helped to teach and improve your scanning skills?
d) Do you feel comfortable asking sonographers and radiologists questions about patient studies and pathologies?
e) Do you feel confident helping sonographers with daily tasks and patients?
f) Do you take the initiative to ask sonographers if you can scan after they have completed working on a patient or do you wait for them to ask you?
g) Are you comfortable doing ultrasound scans on patients and interacting with them?

h) Do sonographers give you sufficient time to practice your sonography scanning protocols and skills when you are at the facility?
i) Do you feel comfortable observing or performing invasive ultrasound studies or procedures like biopsies and working with blood or bodily fluids?
j) Are you emotionally or psychologically affected when you see or scan extremely sick or dying patients?
k) Have you ever had doubts about working in healthcare when you see how fast-paced the clinical environment is at hospitals or outpatient centers?
l) Have you ever had any thoughts about dropping out of the program because of some experiences you had at your clinical site?
m) Thank you for your time and for providing me with valuable information for my research study. Is there anything you would like to say or add before we conclude our interview session?

Appendix E: IRB Approval Letter from the University of South Florida

EXEMPT DETERMINATION

February 22, 2021

Josephine Peck

Dear Ms. Peck:

On 2/20/2021, the IRB reviewed and approved the following protocol:

Application Type:	Initial Study
IRB ID:	STUDY001876
Review Type:	Exempt 2
Title:	Student Perceptions of their Engagement in the Sonography Program and their Associated Intent to Persist
Funding:	None
Protocol:	• Protocol, Version 1, 02. 18. 2021.docx;

The IRB determined that this protocol meets the criteria for exemption from IRB review.

In conducting this protocol, you are required to follow the requirements listed in the

INVESTIGATOR MANUAL (HRP-103).

Please note, as per USF policy, once the exempt determination is made, the application is closed in BullsIRB. This does not limit your ability to conduct the research. Any proposed or

anticipated change to the study design that was previously declared exempt from IRB oversight must be submitted to the IRB as a new study prior to initiation of the change. However,

administrative changes, including changes in research personnel, do not warrant a modification or new application.

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit a new request to the IRB for a determination.

Sincerely,

Various Menzel

Institutional Review Boards / Research Integrity & Compliance
FWA No. 00001669
University of South Florida / 3702 Spectrum Blvd., Suite 165 / Tampa, FL 33612 / 813974-5638

IRB Research Compliance Administration