Medical Students' Improved Confidence as Educators Revealed Through Reflections on Their Teaching in a Student-As-Teacher Course: A Qualitative Study

by

Anna Marie Lama

BA, West Virginia University, 2001

MA, West Virginia University, 2010

Submitted to the Graduate Faculty of the

School of Education in partial fulfillment

of the requirements for the degree of

Doctor of Education

University of Pittsburgh

2021

UNIVERSITY OF PITTSBURGH

SCHOOL OF EDUCATION

This dissertation was presented

by

Anna Marie Lama

It was defended on

May 27, 2021

and approved by
Dr. Scott Cottrell, Professor, West Virginia University, School of Medical Education

Dr. Jeffrey P. Hogg, Emeritus Professor, West Virginia University, School of Medical Education, Department of Radiology

Dr. Keith Trahan, Assistant Professor, University of Pittsburgh, School of Education

Dissertation Director: Dr. M. Najeeb Shafiq, Professor, University of Pittsburgh, School of Education

Medical Students' Improved Confidence as Educators Revealed Through Reflections on Their Teaching in a Student-As-Teacher Course: A Qualitative Study

Anna Marie Lama, EdD

University of Pittsburgh, 2021

Teaching is one of the important roles of a physician educator. Although medical education institutions place much emphasis and resources on faculty development in teacher training, fourth-year medical students (4Y) that graduate to first-year residents who teach medical students are often overlooked in the training. Longitudinal students as teacher courses (SaT) are small communities of practice that support the development of teachers as they transition from 4Y to first-year resident who teaches medical students. There is very little published research on how medical schools are currently executing successful SaT programs which focus on curriculum including teaching skills such as clinical bedside teaching and classroom management.

The purpose of this improvement science qualitative study, set in a medical school in West Virginia, was to examine the improvement of 12 fourth-year medical student teachers' reported confidence levels associated with teaching and learning in the clinical setting and its impact on their overall improvement of teaching skills development in a longitudinal SaT rotation. The study examined 4Y teacher confidence over twelve weeks, in two phases: Phase 1 bi-monthly journaling while student teaching in a Physical Diagnosis and Clinical Integration course, Phase II summative reflective narrative at the SaT midway point in the SaT course. Data collected from both instruments were used to identify similar meaning units—internal and structural relationships between categories of words and experiences—as well as to identify correlations between each

4Ys lived experiences. These data led to understandings of 4Ys' challenges and successes while practicing teaching skills and navigating the educational teaching landscape.

The findings of this study, specifically major meaning units from journal entries and summative reflective narratives, revealed open self-reflections and detailed descriptions of their personal experiences while in the clinical teaching field. Further, these data demonstrate 4Ys' improved confidence in teaching skill acquisition through the repetition of consistent teaching placement practice opportunities within a SaT course. Content analysis revealed four meaning units: clinical bedside pedagogical skills, classroom management pedagogical skills, managing the psychosocial environment, and educator identity formation. Additionally, these data provide a better understanding of the benefit of medical student teachers' SaT course.

Table of Contents

List of Tables

List of Figures

Preface

First and foremost, I would like to acknowledge my parents, Daniel L. Lama Sr. and Connie Lama, for their constant belief that I could achieve anything I set my mind to. To my brother Daniel L. Lama Jr., for believing that I could achieve my goals. Thank you for all of your love and support!

To my Committee Chair, Dr. M. Najeeb Shafiq, I am thankful for your guidance and wisdom. To my committee methodologist, Dr. Keith Trahan, I am forever grateful for your quick turnaround with feedback and gentle encouragement through the "heavy lifting" in the analysis. To Dr. Jeffrey Hogg, my medical education mentor, role model, and instructional creativity coach, thank you for pushing me every step of the editing process. I am so glad you said "yes" to being on my doctoral committee. To Dr. Scott Cottrell, my other medical education mentor and role model, thank you for always being a sounding board when I needed it. I believe each of your contributions as committee members helped me to realize the bigger impact of the work beyond the medical school environment.

To my medical education colleagues, Dr. Samantha Lemus-Martinez, Dr. Jim Lewis, Dr. Philip Hurst, Dr. Jessica Rubino, Dr. Karen Woodfork, Dr. Andrew Shiemke, Dr. Melina Flanagan, each of you have played a pivotal role on my trek across the learning landscape and have seen the work from the inception. I am incredibly grateful for your friendship and thankful for your willingness to try new ideas without fear of failure. To my department of medical education student services co-workers, thank you all for cheering me on over the three years and allowing me to talk about my research with medical student learners!

I would like to also thank each of the MSaE student teachers who participated in this study, especially those who volunteered to complete all of the requirements, and for their willingness to

share their personal and innermost feelings about learning how to teach. Each MSaE student learner trekked the teaching and learning landscape on different paths and yet demonstrated the initial intent of the MSaE course: a community of likeminded individuals who love teaching and learning.

Last, but not least, I would like to hold this space for my EdD 2018 Cohort friends. I cannot imagine a world without them and I am grateful for their friendship. We are the cohort that is what Margaret Wheatley (2002) describes as those "...willing to be disturbed and have our beliefs and ideas challenged by what other thing" as we work together to make the world a better place.

.

1.0 Introduction

1.1 Problem Area: The Need for Medical Students-as-Teacher Courses

Medical students across the United States indicate a growing interest in teaching in academic medicine as a career and are seeking more formal program opportunities to develop their teaching skills before residency (Association of American Medical Colleges [AAMC], 2018; Rana & Freret, 2017). Many medical students identify graduate medical students (residents) contributing to one-third of their knowledge (Bing-You & Sproul, 1992; Kloek et al., 2016; Soriano et al., 2010). In fact, residents are responsible for educating and assessing medical students as a core physician skill (Liaison Committee on Medical Education [LCME], 2012), yet report feeling uncomfortable in their teaching roles without explicit instruction and, therefore, teach ineffectively (Dandavino et al., 2007; Erie et al., 2013; Ramani et al., 2016). Over the past ten years, resident training programs have significantly increased resident-as-teachers training (Al Achkar et al., 2017). However, reported growth in formal student-as-teacher (SaT) training programs to prepare medical students for their transition to role of first-year resident who teaches medical students is minimal.

Medical students want to learn how to teach and are at an ideal stage of psychosocial development for learning teaching skills (Bing-You & Sproul, 1992; Dandavino et al., 2007). Teaching is not an intuitive skill and requires a sequence of modeling, practice, and formative feedback for mastery (Marton et al., 2015). SaT programs are designed to help medical students learn teaching skills such as writing learning objectives, organizing appropriate content for varied learner audiences, teaching modalities to engage learners, and assessment methods in the

classroom. By acquiring early teaching skills in a SaT program, medical students will be more effective communicators, as teaching is an essential aspect of physician-patient interaction. Furthermore, medical students will become better learners through a deeper understanding of medical knowledge and teaching and learning principles (Amorosa et al., 2011; Blanco et al., 2014; Dandavino et al., 2007).

1.2 Background of Problem

The profession of teaching is like no other. Great variation in informal teaching skills trainings exists in all accredited medical schools with workshops or extracurricular involvement with teaching and tutoring, yet only a moderate percentage of medical institutions provide formal educational training programs with educational objectives (Morrison, 2001; Soriano, et al., 2010). Evidence indicates that high-quality SaT programs are taught longitudinally and spiraled within established undergraduate medical education curricula. Medical schools such as University of Toronto, University of Rochester, Mayo Clinic, and The George Washington University have developed programs which engage SaT students in cycles of feedback through looped field teaching skill practice connected to course content achieving specific aims and goals (Blatt & Greenberg, 2006; Erie et al., 2013; Song et al., 2015; Yeung et al., Albert, 2017; Yoon et al., 2017). Unlike these programs, most undergraduate medical education SaT programs are condensed to variable instructional formats with limited opportunities to continuously practice and develop new teaching skills (Yeung, et al., 2017); Therefore, it is necessary to understand the system and key characteristics of a teaching course which will impact the transition of students to first year resident educator.

1.3 The System

1.3.1 Mission, Vision, Values

The West Virginia University School of Medicine (WVU SoM), Department of Medical Education, is dedicated to educating the next generation of providers. The 2020 Strategic Plan for WVU SoM contains standards and goals aligned with overarching themes (e.g., Student Education) which serves as a guiding principle for the overall institutional mission to "Develop and implement new programs, or augment existing components of the educational experience, based on student feedback and assessment, facts-based needs, and/or financial viability" (West Virginia University, 2016, Goals 1). Within this plan, differentiation is a key indicator and the institution is supported by way of design and creation of new and frequent teaching opportunities where student progress is inevitable. The mission and vision of WVU SoM is to improve the health of West Virginians through service with a connection of students, teachers, staff, practitioners and researchers who value health, wellness, research and innovation (West Virginia University, 2019).

The medical school curriculum is carefully crafted to combine all of the aforementioned points in the pre-clinical and clinical years, insofar as medical students achieve excellence through a variety of diverse and rich learning experiences. The school fosters bi-directional transfer of knowledge between classroom and clinic with a commitment to promoting excellence in teaching and learning. In this practice, faculty, students and staff are engaged in interprofessional communities of practice to translate this knowledge. Twenty-eight different departments are connected to the school of medicine, each filled with various people roles which support the daily

function and structure of the medical education curriculum[1]. Every clinical and pre-clinical department is responsible for collaboratively designing their course specific content, selecting the appropriate faculty to teach the content, and training their educators on course learning expectations and methods of delivery (LCME, 2016, p. 19)[2].

1.3.2 Self as a System

I am the Director of Assessment for the West Virginia University School of Medicine and oversee all faculty, course, and student evaluation data and delivery of training related to teaching practice and quality improvement. In my role, I can "utilize the privilege I may have in other aspects of my life (e.g., language, class, status in the workplace)" in order to "leverage power and be heard" (Sensoy & DiAngelo, 2012, p. 207). This direct current of power allows me freedom to create needs assessments, infuse fresh perspective, and disrupt the constructs that bind change by asking the following: How are we serving our patient population through first-year residents who teach medical students that cannot communicate or teach well?

---

[1] Clinical Departments are comprised of: Anesthesiology, Behavioral Medicine & Psychiatry, Cardiovascular and Thoracic Surgery, Community Practice, Dermatology, Emergency Medicine, Exercise Physiology, Family Medicine, Internal Medicine, , Neurology, Neuroradiology, Neurosurgery, Obstetrics & Gynecology, Occupational Therapy, Ophthalmology & Visual Sciences, Orthopedics, Otolaryngology, Head & Neck Surgery, Pediatrics, Physical ;Therapy, Physiology and Pharmacology, Radiation Oncology, Radiology, Surgery, Urology. Pre-clinical departments are comprised of: Biochemistry, Medical Education, Microbiology, Immunity, & Cell biology, Neuroscience, Pathology, Anatomy & Laboratory Medicine.

[2] LCME Element 9.1: Any faculty instructors in the medical education program who supervise or teach medical students must be familiar with the learning objectives of the course or clerkship and must be prepared for their roles in teaching and assessment"

1.4 Stakeholders

Productivity within a system requires several parts: people, tools and processes (Bryk et al., 2016). In higher education, thinking anew comes with certain constraints and requires the support of people closely connected to the problem—the stakeholders.

Table 1: Stakeholder Groups Closely Connected to the Problem of Practice through Empathy Interviews

Stakeholder Group	Connection to Problem of Practice	Key Questions Asked
Fourth-Year Medical Student	Medical students are the faculty of the future, the change they wish to see in education—clinical and classroom.	How will this SaT program benefit me as a future graduate resident educator? What challenges or barriers will I have in my current school schedule that conflict?
Administration	The administration group controls department resources and organizational development on all three campuses.	Is the MSaE Rotation part of the curriculum requirements? Will the rotation be sustainable throughout curriculum changes to come? What are the challenges and barriers to successful completion of the rotation?
Clinical and Pre-Clinical Course Directors	Directors are instrumental in creating opportunities for the SaT students to practice teaching within their established curriculum in student teaching placements.	Am I equipped to teach medical students how to teach? What if the student doesn't want to take my advice?
Residency Program Director	Residency program directors are fully committed to finding the best candidates to be part of their program, including fourth-year medical students who know how to teach and communicate well through organization of presentation with all patient types.	What can your fourth-year medical student offer my program as a resident educator? What teaching projects and ideas do they have for education and innovation in medicine at my institution?
Patient Community	Patients will receive great benefit from the MSaE course implementation and the fourth-year students who take the course.	Will this doctor be able to communicate my needs? Will s/he take time to explain what I am afraid to ask?

Notes. Table 1 represents the five stakeholder groups identified in this adaptive challenge and their response from empathy interviews.

1.4.1 Fourth-Year Medical Students

The fourth-year medical students are one of the largest stakeholder groups who will be positively affected by the problem of practice implementation. Without formal teaching opportunities in their curriculum, medical students will not know how to take advantage of skills such as classroom instruction methods, learner engagement, presentation organization, and communication. Competing commitments with established curriculum and electives specific to their residency program choice are notable values and interests that may prevent students from selecting the SaT course[3]. Additionally, this group must grapple with obligations for residency interviews such as travel, time in academic year to interview, and preparation for graduation. Residency program directors who interview fourth-year medical students about their teaching experience in a SaT course could shift the mindset with this group and how they value the course overall.

1.4.2 Administration

Administration will include deans from each of our three campuses, student services employees that work closely with students (e.g., fourth-year schedulers, program administrators), and specialists (academic operations, accreditation). While all stakeholders in this group support

[3] "Established curriculum" is defined by Freret et al., (2017) as "coursers in which formal teaching material has already been developed and the teaching faculty are eager to mentor senior medical students" (p. 412). In traditional medical school curriculum, these may include Problem-based Learning, Physical Diagnosis and Clinical Integration, Sub-Internships and Critical Care courses. Engagement of WVU SoM directors, faculty, and staff is one of the critical first steps in the movement of the intervention to provide a student teaching placement experience and equity-relevant design (Mintrop, 2016). To this end, meetings have already occurred with established courses, their directors, and administrative personnel. Approvals for the cooperating preceptors have been secured.

the SaT course and the overall aim, some group members will directly oppose the initiative if it is a “required” part of the curriculum as they see the risk in conflict with fourth-year scheduling. What is notable about this group is that their driving behavior is purely for the interest of the students. The strongest values with this group are concerns with medical schools producing more ineffective first-year residents who teach medical students who cannot teach and, therefore, will support any teaching opportunity for their students.

1.4.3 Clinical and Pre-Clinical Course Directors

This stakeholder group will be positively affected by change, yet they struggle with internal conflicts about worth, ability, and time commitments. A main reason for this group to impede progress includes fear of uncertainty with skill ability and finding time to coach students individually. Competing commitments with protected time versus research lab obligations and patient clinics will nudge directors to either find collaboration time to support teaching medical students teaching skills or simply refuse due to other obligations and lack of interest.

1.4.4 Residency Program Director

The residency program director could have the most invested interest in the POP rotation. When fourth-year medical students interview for their graduate residency positions, they meet with program directors in respective fields (e.g., Surgery, Family Medicine, Pediatrics, etc.) to discuss their interest in the program and institution. Additionally, an LCME accreditation requirement requires first-year residents who teach medical students to be trained formally in a resident-as-teacher program through their residency program (LCME 9.1, 2019). Therefore, a medical student

with prior training through a SaT program teaching could equate to less time and fewer residency program resources would be spent for teaching fundamentals of teaching and learning when they enter the residency.

1.4.5 Patient Community

What happens when patients are not able to articulate how they feel to their physician? What happens when the physician is not able to organize their thoughts and clearly communicate important information with patients about their care? Each clinic and hospital associated with WVU SoM has a diverse patient community involved in understanding their healthcare and healthcare providers. Not only will the physician be able to listen closely to the needs of the patient and apply medical knowledge to the issue, but they will also demonstrate excellent communication skills, on-the-fly decision making with varied patient learner types, and attention to detail in follow-up and organization.

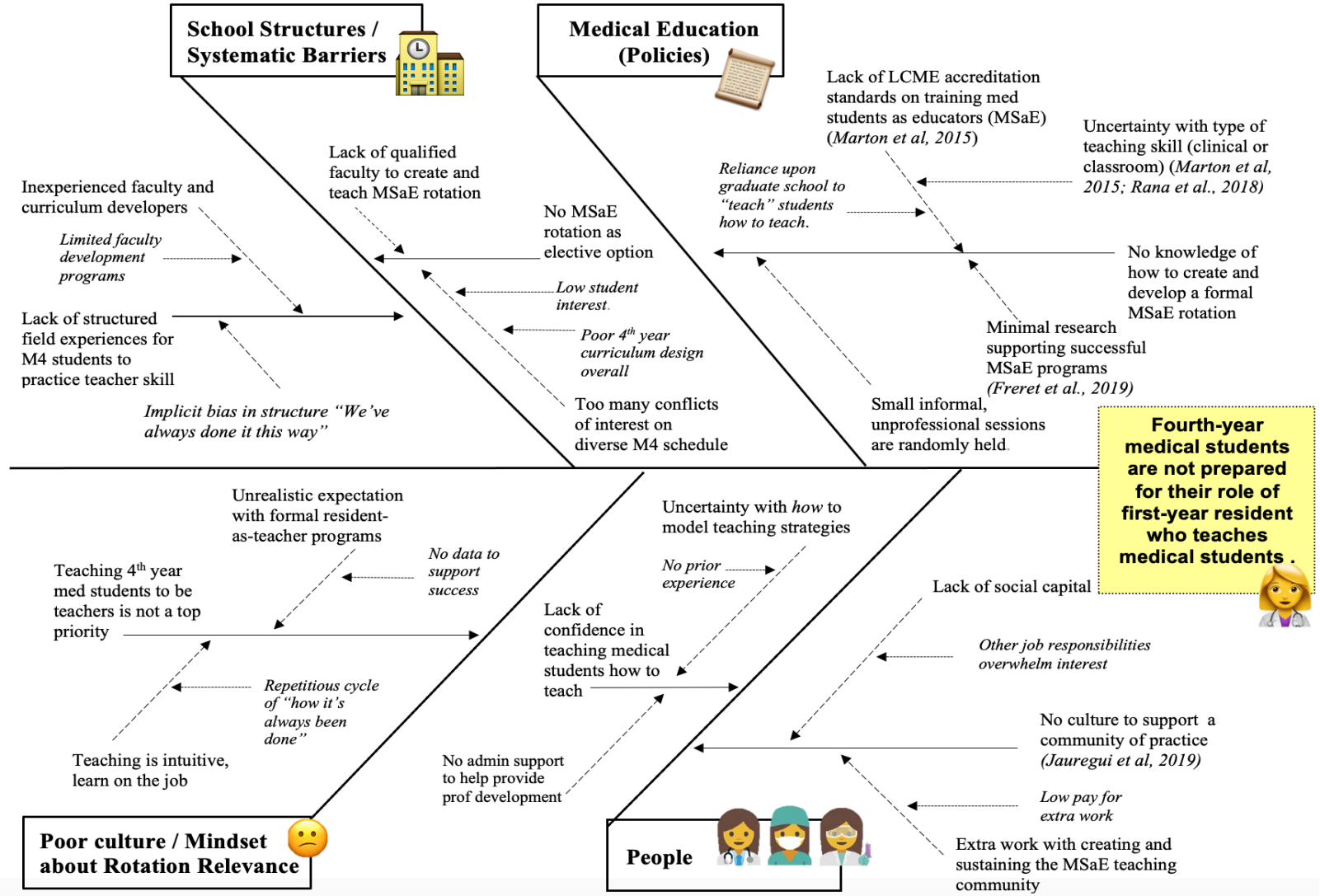


Figure 1: Fishbone Diagram Illustrating Root Causes Contributing to Problem of Practice.

Through a causal system analysis (Figure 1), four root causes illustrated contribute to the problem of practice: people (stakeholders), poor culture (mindset), policies, and systematic barriers/school structures. People (stakeholders) have a natural attraction to do things the way they have always been done, in the hope of recreating a sustainable product and in the fear of change. Fear of change can include uncertainty with *how* to model teaching strategies without prior experience, no social capital through faculty development communities, and a lack of shared cultural values where education is a key component of medicine. Poor culture, or mindset, goes beyond the mission and vision of the school and more towards positionality. Policies are like branches of a tree that dip into different pools of water spanning various communities like faculty development, student development, and institutional function.

Several substantial systematic barriers to the formation of formal SaT programs lend themselves to the broader problem area (Figure 2). The first barrier is the lack of clearly defined standards from accrediting bodies for program design or teaching skills curriculum (Marton et al., 2015). Fourth-year medical students' course schedules are diverse and varied between electives, residency interviews, and medical licensing exam test dates. This fast-paced nature of the fourth-year schedule makes pausing to see the value and impact of a SaT program in their future role of first-year resident who will be teaching medical students of secondary importance, constituting another barrier (Soriano et al., 2010). Additionally, research supporting the longitudinal success of formal programs along the teaching continuum (student-as-teacher, resident-as-teacher) is minimal, a third barrier (Freret et al., 2017; Soriano et al., 2010).

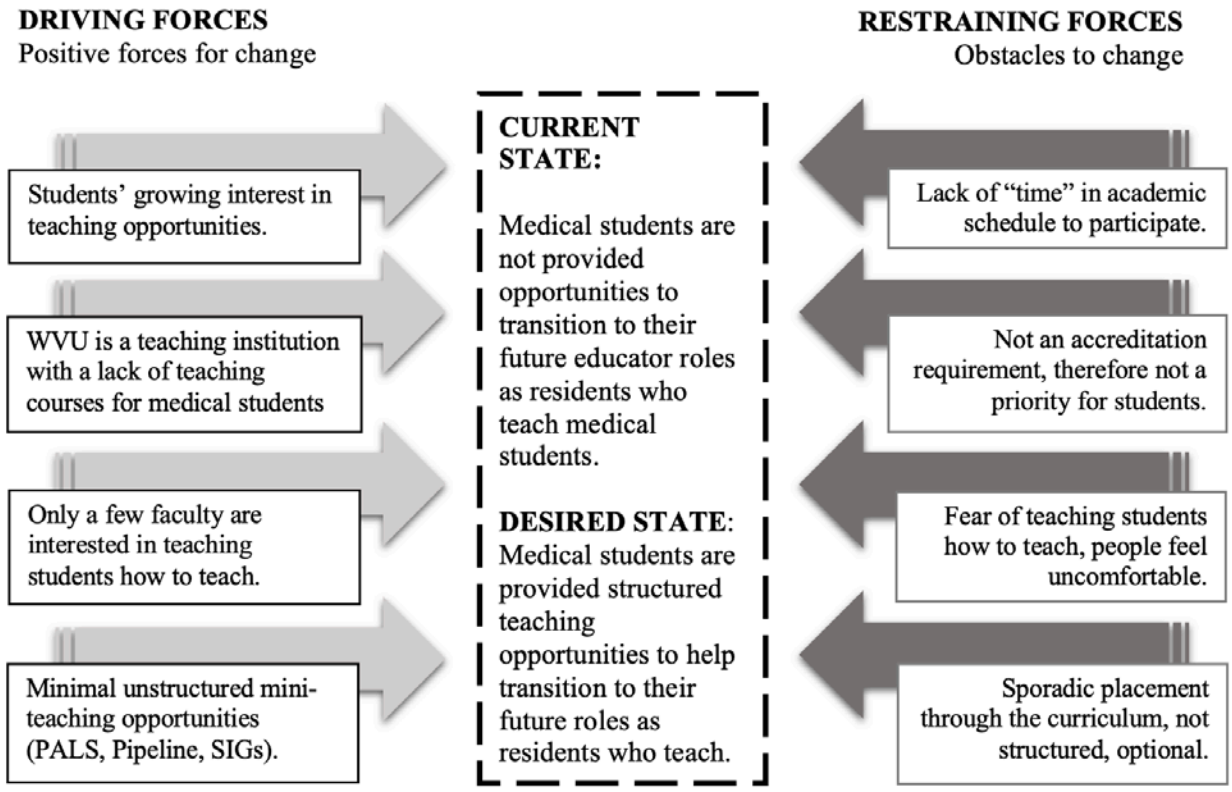


Figure 2: Forcefield Analysis of the School Structure/Systematic Barriers.

1.5 Problem of Practice:

At West Virginia University School of Medicine, fourth-year medical students are not prepared for their role as first-year resident who will be teaching medical students. They are not confident in their teaching skill ability. As a result, many of these first-year residents who will be teaching medical students generally have difficulty presenting medical knowledge to large and small groups of learners through lack of teaching skill acquisition and are ineffective communicators—a competency the organization values in their education of patient population of West Virginia. In reflection of the system analysis previously mentioned in the section above, an

actionable response to this problem would be to develop a formal SaT program where fourth-year medical students could engage in teacher skill development before stepping into the role of a first-year resident who will be teaching medical students.

The organization is poised to both facilitate and yet obstruct the problem of practice to provide teaching opportunities which better support the transition of fourth-year medical students to the role of first-year resident who will be teaching medical students. This problem is urgent as residents begin teaching medical student learners from day one of their residency. While the LCME, which accredits medical schools, requires institutions to develop and implement graduate medical education resident-as-teacher programs, not all programs successfully support a structured curriculum which focuses on teaching skill acquisition such as writing learning objectives, organization of appropriate content for varied learner audiences, teaching modalities to engage learners in the classroom or clinic (Amorosa et al., 2011; Blanco et al., 2014; Dandavino et al., 2007). In my role as Director of Assessment, I work closely with all stakeholders in the areas of curriculum and education design. I am also former public school teacher who has completed a traditional teacher preparation program and who is closest to the problem in design. Therefore, the addition of a formal SaT program is feasible and is an actionable need across the organizational system.

1.6 Definition of Key Terms

The following operational definitions are used to assist in the understanding and context of this study:

Cooperating Preceptor. Similar to a student teaching program in the United States, the term "cooperating preceptor" refers to the clinician in whose clinic (and classroom) the fourth-year medical student is placed and who guides the student teacher through the student teaching placement (National Council on Teacher Quality [NCTQ], 2011).

Established Curriculum. These are courses where formal teaching material has already been developed and course directors and faculty are able to mentor senior level medical students comfortably (Freret et al., 2017, p. 412).)

Junior Learner. Medical student who is in the second year of medical school and is being taught by the 4Y.

Fourth-Year Medical Student (4Y). Medical students who are in their fourth and final year of medical school and are enrolled in a student-as-teacher course. This term is used synonymously with the term "student teacher."

Post Graduate Year Resident (PGY-1). A graduate medical trainee who is a physician and has completed requirements of a doctoral level medical school degree (AAMC, 2020), also known as First-year residents who will be teaching medical students.

Formal Teaching Program. A course wherein students must register and receive course credit and students must complete some type of classroom education that focuses on teaching skills training" (Soriano et al., 2010, p.1726). In the context of curricular design, this definition makes clear the need to visibly place the program on a prospective student's schedule, define goals and aims for specific teaching skill development, and provide summative evaluation—a typical requirement of a voluntary fourth-year elective.

Liaison Committee on Medical Education (LCME) – A voluntary, peer-reviewed accrediting body for educational programs at medical school institutions in the United States and Canada (LCME, 2020).

Longitudinal Programs. Programs that focus on development of teaching skills over time, often spanning an academic year (Freret et al., 2017; Rana, et al., 2017).

Residency. Sometime called postgraduate training, residency is a stage of graduate medical education that lasts up to five years after completion of a medical school program within a hospital specialty program (AAMC, 2020).

Students-as-Teacher Program (SaT). A program developed to help beginning medical student educators within the undergraduate curriculum. SaT programs can be formal or informal in design (Marton et al., 2015; Yoon et al., 2017).

2.0 Review of Supporting Literature

2.1 Introduction

In this study, I examined the current status of SaT programs in medical education, early educator identity formation through communities of practice, and the qualities of SaT programs that support the transition from the role of medical student to resident. Teaching is increasingly recognized as a core professional skill across the medical education continuum and requires ongoing training, practice, and feedback (Dandavino et al., 2007; Marton et al., 2015). A carefully designed longitudinal SaT elective, for fourth-year medical students, can benefit students, faculty, and institutes by supporting their successful transition to PGY-1. This review describes the findings of empirical studies and literature that helped build the foundation for this study, as well as the implications it may have on further studies in the area of medical student teacher training.

This literature is organized into three sections:

1. Student-as-Teacher Program Designs in Medical Education
2. Educator Identity Formation and Communities of Practice
3. Transitions to Residency

2.2 Student-as-Teacher Program Design

The successful formation and maintenance of a formal SaT program hinges upon: (a) breadth of program reach within the institution, and (b) depth of content taught within the course.

The design and implementation of formal SaT programs across U.S. medical schools has been widely researched and discussed with little consensus on a standardized curriculum. Because there are no standardized teaching curricula, teaching competencies, or set milestones indicating measurable outcomes that all medical students should learn before stepping into residency, institutions are left to rely upon the research and recommendation of their peers (Blanco et al., 2014; Marton et al., 2015; Pasquinelli & Greenberg, 2008; Soriano et al., 2010; Yu, Wilson, Sing, et al., 2011;).

2.2.1 Types of Program Design

The primary aim of formal teaching skills programs is to improve student teaching skills. A secondary aim is to foster educator identity in medical school, residency, and beyond (Freret et al., 2017; Soriano, et al., 2010). Much of the research in medical education journals use the terms *formal* and *structured* interchangeably and refer to programs that are typically incorporated into the medical curriculum and require students to enroll for course credit or certificate of completion. Formal program design is unlike common methods of teaching skills programs such as peer teaching, workshops on educational topics, outreach programs, and extracurricular student-led sessions that do not always take place on a consistent schedule nor offer the benefits of sustainability through consistent teaching experiences (Marton et al., 2015).

Longitudinal programs that focus on development of teaching skills over time have a positive effect on student performance outcomes. For example, longitudinal programs spanning an academic year can develop early educator identity (EID) formation knowledge of adult learning theory (e.g., cognitive, social, and behavioral), and teaching skill (e.g., clinical, classroom) development by providing students with more content modules, teaching opportunities, and peer

mentoring partnerships (Blanco et al., 2014; Freret et al., 2017; Song et al., 2015; Yeung et al., 2017). Some studies posit that longitudinal programs may also help students understand the value of peer observation and feedback in improving their teaching skills (Bandeali et al., 2016; Blatt & Greenberg, 2007; Freret et al., 2017; Rana et al., 2017). The University of Rochester School of Medicine and Dentistry noted the strongest change in their SaT program outcomes with subtle adjustments to an existing program design (Song et al., 2015). Core strategies used included the implementation of a didactic schedule on structured pedagogical skill training modules (e.g., writing learning objectives, new teaching modalities, assessment in the classroom, peer observation feedback). The MEP program neatly nests a peer observation framework into established curriculum where mentors, faculty, and students attending the lecture give formative feedback on the medical student's teaching field experiences (Song et al., 2015). Student participants in the University of Toronto Medical School longitudinal SaT program reported measurable gains in their teaching confidence, communication skills, and ability to provide feedback through the teaching opportunities for field experience (Yeung et al., 2017). Core strategies that make this program an exemplar include a defined didactic schedule on principles of adult learning and teaching modalities common to clinicians (e.g., wards, small-group). Both programs provide a subtle emphasis on early formation of educator identity through practical teaching sessions and peer observation feedback. Key components such as feedback and self-reflection skills to improve communication skills, classroom engagement, and stronger pedagogical knowledge of content could be beneficial to SaT programs.

Longitudinal SaT programs integrated with established courses provide sustainability for student teachers and faculty educators. For example, the TALKS program at The George Washington School of Medicine and the STEP program at Tufts University School of Medicine

both provide a student teaching laboratory-type environment within medical school physician clinical skills courses (Blatt & Greenberg, 2007; Erlich & Shaughnessy, 2014). Both programs intertwine peer teaching between fourth-year medical students and first- and second-year medical students on clinical teaching skills (e.g., history-taking techniques, physical performance, feedback) through team-taught, small-group facilitation sessions with course faculty. Notable gains for the fourth-year student data included an increase in teacher self-confidence working with challenging learners, providing formative feedback, gained knowledge of teaching material, refining ability to perform specific clinical teaching skills, and overall enthusiasm in and for teaching (Blatt & Greenberg, 2007; Erlich & Shaughnessy, 2014). Similarly, the SaT program at Mayo Medical School, nested within an anatomy-based Human Structure course, serves as a teaching apprentice program with teaching faculty (Erie et al., 2013). Designed to serve students committed to developing classroom teaching responsibilities such as organizing review sessions, creating didactic briefing sessions, and tutoring low performing first-year students in the course, participants reported feeling significantly more prepared for residency than respondents who were in residency at the time (Erie et al., 2013). In both examples, the institution plays a significant role in creating and sustaining field teaching opportunities for students to be involved in meaningful experiences within existing courses.

2.2.2 Curricular Design

The necessity to define best curricular content priorities within a SaT program stems from LCME Element 9.1 (LCME, 2018). LCME Element 9.1 requires that residents in the medical education program who supervise or teach medical students are prepared for their role teaching and assessment medical students (LCME, 2018). However, there is not a standard consensus on

curricula for SaT programs in the United States, requiring institutions to determine what teaching skills content is most accurate for the PGY-1. Several national studies report findings that can be grouped into two teaching skill program content: (a) clinical teaching skills, or work-based teaching, and (b) classroom teaching skills (Marton et al., 2015; Rana et al., 2017; Soriano et al., 2010). Clinical teaching skills include bedside teaching (e.g., history taking), small-group teaching, and teaching procedural skills (e.g., suturing) (Haber et al., 2006; Marton et al., 2015; Yeung et al., 2017). Classroom teaching skills include adult learning theory, teaching modalities (e.g., flipped classroom, small-group, problem-based learning), curriculum development and learning objectives, effective feedback (e.g., formative, summative), and peer observation foundational to developing teaching acumen in pre-clinical and clinical classrooms (Bandeali et al., 2016; Freret et al., 2017). The prioritization of which type of skills should constitute an institution's SaT program curriculum can best be accomplished through review of overall program aims and goals (Blanco et al., 2014).

Longitudinal SaT program electives are innovative and of increasing relevance to learners, teachers, and patient care within the healthcare system. Medical schools considering the SaT program elective for their medical education program will find the design process to be diverse, creative, and adaptable in any academic environment. SaT design models which provide well established goals and objectives (Blanco et al., 2014), iterative teaching opportunities (Rana et al., 2017), continuous formative feedback from peers (Blatt & Greenberg, 2007; Freret et al., 2017), and a wide variety of content covering classroom and clinical teaching skills, will ensure medical students are equipped with high-yield teaching skills to enter their role of PGY-1.

2.3 Educator Identity Formation and Communities of Practice

Teaching is part of professional educator identity—particularly in clinical work-based education, competency development, and teacher training program communities. To provide a global perspective on educator identity formation, one must first understand the implications that educator identity formation and communities of practice has on ensuring students are successful in their teaching practice. This section below is structured in providing the literature on educator identity formation, communities of practice, and peer observation feedback models that have taken place to help with student teacher development.

2.3.1 Educator Identity Formation

The concept of Educator Identity (EID) formation and Communities of Practice within the educational landscape of practice is based on a social identity theory by Wenger (1998, 2015) where he describes the construction of knowledge within learning landscapes of practices formed by multiple communities of practice (Wenger-Trayner et al., 2015). In this metaphor, the *landscape of practice* is the larger picture of an occupation (e.g., doctor, resident, medical student) and the communities of practice are those areas of the occupation in which we identify ourselves (e.g., research, teaching, patient care, special interest groups) with likeminded people and shared interests (Cantillion et al., 2016; Jauregui et al., 2019; Wenger, 1998; Wenger-Trayner et al., 2015). People within a community of practice are knitted together through mutual engagement on a consistent basis where shared ideas for innovation and change ideas are continually renegotiated. Therefore, learning is a journey through multiple communities of practice within an individual's

career due to matters such as experience, competence, and knowledgeability across the learning landscape (Wenger, 1998; Wenger-Trayner et al., 2015).

The ways in which students see themselves in their medical school community and teaching community can leave the largest impact in early EID formation and patient care. EID formation is reflected through definitions from Goldie (2012) and Jauregui et al. (2019). Goldie (2012) defines educator identity formation as "ways of being and relating in professional contexts…realized and developed through social interactions" (p. 641). Jauregui et al. (2019) refer to it as "created in and shaped by the contexts in which individuals interact through an ongoing process of reinterpretation and negotiation" (p. 122). Both authors see *contexts* as day-to-day events and interactions that form the setting for learning which play some part in identity shaping. For example, a context could include observing small group teaching in a family medicine clinic and providing formative feedback to the teacher on teaching practice for future improvement. Embedded within a person's EID are the observations of others which inform and influence how one connects through their communities of practice.

2.3.2 Communities of Practice

The term "communities of practice" was first described by Lave and Wenger (1991), expanded upon later by Wenger (Wenger, 1998; Wenger-Trayner, 2015), to describe how the participants or "apprentices" will master specific knowledge and skills through doing in the lived-in educational landscape—a living curriculum for the apprentice (pp. 29-31). SaT programs provide a community of practice within the 4Y medical student learning landscape where they master knowledge and skill on teaching and learning. While the students are at the lowest part of the metaphorical landscape, their trajectory towards professional heights requires rich textured

teaching experiences and opportunity for feedback and reflection, so that they see a projected image of future self as a physician and educator. For example, a student paired with a surgical instructor mentor, who works with simulation equipment in the operating room, may identify with surgery and simulation teaching yet "disidentify" with non-surgical specialties and researchers (Chen et al., 2017; Wenger-Trayner et al., 2015). This is significant in the development of student EID formation in that the student will become connected with surgical teaching communities, acquire professional relationships with the surgical residents and faculty, and hone skills (such as suturing and patient debriefing skills) specific to the content area. Over time, the learning community connection to surgery and simulation teaching will create multiple opportunities, or career pathways, for the learner to navigate their learning edge with mastery of new material (Wenger, 1998). Within the SaT program community of practice, medical students interact and identify with educator role models and mentors and begin to visualize their projected images of selves as potential future educators within their learning landscape (Chen et al., 2017; Goldie, 2012; Jauregui, et al., 2019; Wenger-Trayner et al., 2015).

2.3.3 Peer Observation of Teaching

In the context of SaT program development, EID formation begins by interacting with teaching faculty and peers, in their community of practice, that provide direct feedback and modeling of professional behavior (Goldie, 2012; Wenger-Trayner et al., 2015). Peer observation of teaching provides engagement and imagination by refocusing the learning lens towards EID formation development through repetition of teaching, observation, and self-reflection. The word *peer* is typically understood in medical education literature to be a coworker or colleague (Rees et al., 2015; Sullivan et al., 2012). For the purposes of this literature review, the word "peer" will

include teaching faculty such as cooperating preceptors and other 4Ys who share similar interests in teaching and learning within a SaT community of practice.

Peer observation of teaching can be delivered in several ways. However, the most familiar structure is a three-phase collaborative process nested within curriculum where peers plan a pre-observation goal setting meeting, observe each other's' teaching, and meet post-observation with descriptive, formative feedback for the purpose of learning and teaching improvement (Bell et al., 2019; Finn et al., 2011; Rees et al., 2015; Sullivan et al., 2012). This type of process allows for educators to connect with their colleagues in a collaborative working relationship, reflect on instructional skills, and engage in discussions about best teaching practices.

Peer observation of teaching can have a pivotal role in a SaT program by increasing self-awareness and long-term changes to teaching practice. Training students in peer observation techniques (Rees et al., 2015; Sullivan et al., 2012) and providing them opportunities to give and receive formative feedback (i.e., verbal and written) (Katz-Sidlow et al., 2016) have been identified to enhance teaching skill development within a safe learning environment. In fact, feedback that builds on teaching experience, repetition, and reflection of practice will foster deeper learning and improved teaching ability uptake (Finn et al., 2011; Sullivan et al., 2012).

2.3.4 Feedback Models

Several medical institution feedback models offer techniques to cultivate communities of practice that share a purpose of introducing teachers to peer observation feedback as faculty development. The Teaching Triangles model connects students and faculty through two communities of practice: (a) the community created in the teaching triangle group, and (b) the communities of teaching practice in the SaT program curriculum (Rudd et al., 2014). Participants

in the “Doctor Coach” framework, originated by Gifford and Hall (2014), students and faculty are connected through a cyclical, one-to-one peer coaching environment integrating observation, self-reflections, and peer coach feedback (e.g., written, verbal) (Gifford & Hall, 2014; Tchekmedyian et al., 2017). The provision of direct rapid feedback in resident education identified medical student written feedback as a technique to improve quality of small group teaching over multiple teaching iterations (Katz-Sidlow et al., 2016). Video-based observations with guided reflection have proven equally beneficial in fostering a sense of community through direct feedback of teaching skills and improved growth mindset (Merriam & Tisdell, 2018). Exposure to peer observation models, techniques, and skills should be nested in such a way that offers cyclical practice within the medical teaching setting (clinic, classroom) (Sullivan et al., 2012). When individually implemented within a formal, longitudinal SaT program, these observation styles may provide foundations for collaborative learning skills and a faculty development EID mindset. By teaching how to give and receive observation feedback, the SaT program sets a mindset among the medical students of professional teaching practice.

SaT programs can serve as a community of practice for medical student educators. The community provides a safe and structured environment for students to relate to professional contexts such as teaching values, norms, and approaches to teaching practice (Cantillion et al., 2016; Goldie, 2012). There is evidence to suggest that peer observation models work as a faculty development instrument forming EID formation. SaT programs that nest peer observation models within can serve as a buttress of support for early EID formation and communities of practice collaboration.

2.4 Transition to Residency

At many medical institutions across the United States, teaching responsibilities begin at the start of residency. The transition from fourth-year medical student to first-year resident in a graduate medical education program is complex and often overlooked. Stakeholders uncertain about the best elective options for the fourth-year medical student may find SaT programs as a foundation to help bridge the gap between undergraduate and graduate medical education (Benson et al., 2015; Morgan et al., 2016*)*. Schlossberg's (1981, 1984) transition theory framework can be useful in considering the socioemotional transition process of fourth-year medical students and SaT programs can facilitate these transitions. After this overview, I will introduce specific examples of how SaT program content can contribute to the transition process.

2.4.1 Transition Theory

Transition theory was defined by Schlossberg (1981, 1984)) as "any event, or non-event that results in changed relationships, routines, assumptions, and roles" (Anderson et al., 2012, p. 39).

Table 2: Schlosberg's 4S System Defined With Connection to SaT Program Educator Identity (EID).

Factor	EID Connection	Key Question To Ask Self
Situation	Transitions require cognizance of a role change. SaT programs can closely model the values and norms of the future new role as resident and educator (Wenger-Trayner et al., 2015).	What could I not do that I can now?
Self	Transitions require the ability to overcome obstacles in the face of optimism (Anderson et al., 2012). SaT programs can develop resilience through repetition and self-reflection, core skills for physicians and educators.	What is my purpose and outlook?
Social Rapport	Transitions require networks (Anderson et al., 2012) or communities of practice of peers and mentors (Wenger-Trayner et al., 2015). SaT programs offer teaching skill development	What is available to help me handle stress?

	through feedback of peer teaching to shape and support the learner.	
Strategies or coping responses	Transitions to residency can be significant in terms of work role and EID (Walzak, et al., 2019; Wenger-Trayner et al., 2015). SaT programs provide teaching strategies and resources to effectively cope with any challenging classroom or clinic teaching situation (Anderson et al., 2012).	What will help me navigate the situation?

***Note*.** The factors used are taken directly from Schlossberg's text while the EID connections have been modified to correlate with SaT program design.

Events constitute the changes (e.g., marriage, adoption of a child, starting a new job) as well as the non-events (e.g., career aspirations never actualized) (Anderson et al., 2012). The positive impact of transition outcomes relies not on the change itself but rather on the person's perception of the change. Self-perception about the type, context, and impact of the transition will help articulate the significance of the change for the individual (Patton et al., 2016). For example, a PGY-1 who experiences their teaching role as an anticipated transition with EID formation constitutes a positive impact transition whereas a PGY-1 who anticipates the teaching role to be another unwanted requirement will not see it as a transition but as a task. While both residents are moving along a similar job trajectory, their self-actualization of the role transition is not equal and will require varied levels of time to navigate the growth process (Patton et al., 2016). Schlossberg identified four factors that influence how one navigates transitions (Table 1). The transition process through each of the four factors for both first-year residents who teach medical students, in the previous example, is relative to time and resources. Additionally, how well the individual can answer the key questions to self and can appraise their situation in context will bolster confidence and ability to cope.

Transition theory is best supported through a structured sequence of instruction, practice, and feedback within a community of practice. SaT programs provide the basis integration into academic communities of practice by moving a student along the trajectory in support of that

transition. Figure 3 is an adaptation of the Fenton-O'Creevy et al., (2015) model illustrating the trajectories from role of medical school student to resident (p. 46). Line (a) represents a typical workplace transition from student to first year resident without a SaT program option. Lines (b) and (c) represent versions of trajectories through a SaT program option or extracurricular, non-sequential teaching opportunities outside of a SaT program. In trajectory (b), students are described as *tourists* – they never fully engage in the teaching community of practice long enough to form identities in educational practice through feedback and repetition. Events in this trajectory may include single-session workshops or weeklong electives. In trajectory (c), the students are viewed as *sojourners* – their time within the community of practice is temporary but actively engaged with fellow learners and teachers embracing their EID (Fenton-O'Creevy et al., 2015). It is within the last trajectory that medical students will continuously develop and shape their teaching skills and recognize their learning edge through involvement in teaching experiences.

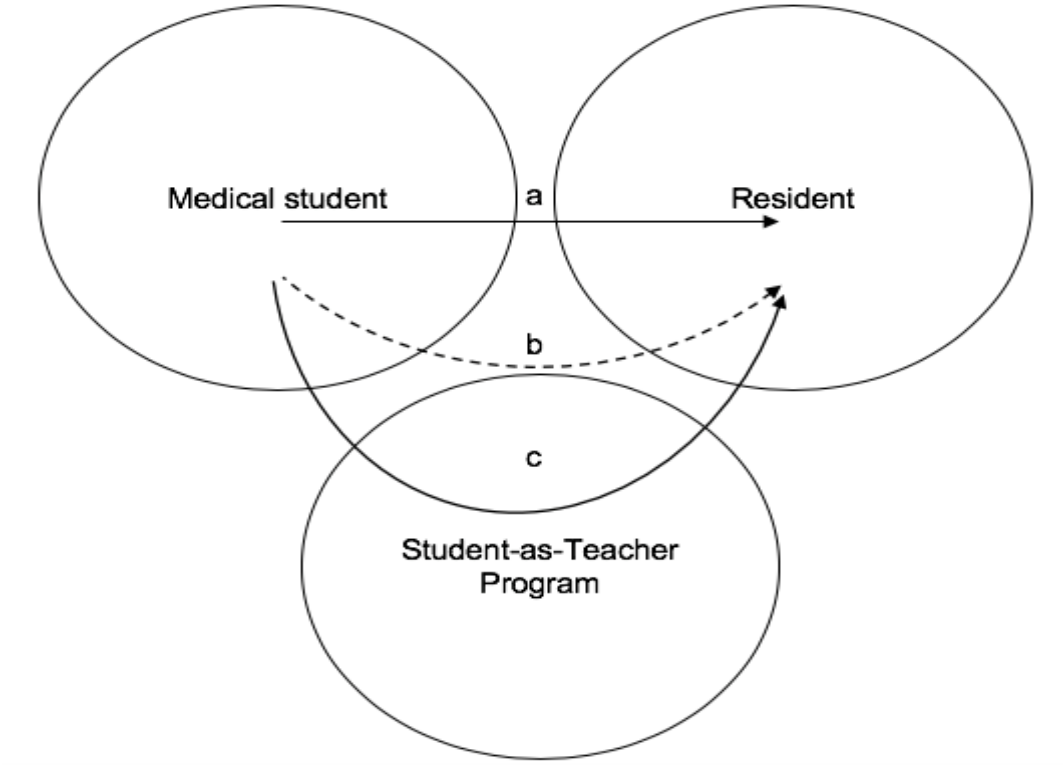


Figure 3: llustration of Medical Student Trajectories from Role of Medical Student to Resident

Note. This figure is an adaptation of the Fenton-O'Creevy et al., (2015) model and represents the illustrating the trajectories from role of medical school student to resident.

The fourth year of medical school should facilitate transitions to residency (Benson et al., 2015), and SaT programs can serve as a feasible elective option to bridge the continuum between medical school and residency. Unlike extracurricular, non-sequential teaching workshops, SaT programs lend themselves to important outcomes central to the growth and development of physicians and educators. These include student resilience and decision making (Anderson et al., 2012; Walzak et al., 2019), giving and receiving feedback (Sheu et al., 2016; Yoon et al., 2017), development of professionalism (Lyss-Lerman et al., 2009), and EID discovery (Goldie, 2012; Jauregui et al., 2019; Yoon et al., 2014). Additionally, future PGY-1s must demonstrate clinical, or work-based skills, ideally in the direction of clinical competency-based skill acquisition (Lyss-

Lerman et al., 2009). These include practice-based learning and improvement (Lyss-Lerman et al., 2009; Yoon et al., 2017); interpersonal & communication skills (Sheu et al., 2016); and professionalism (Michael et al., 2019). The amalgamation of the work-based competencies are embedded in the day-to-day events, the context of caring for patients, and interactions that continue to form educator identity shaping.

The educational learning curve that impedes student success as a PGY-1 reflects a strong need for attention to improve the continuum between undergraduate and graduate medical education. When observed across the learning continuum, it becomes apparent that SaT programs are key in developing self-efficacy and growth as educators (Dandavino et al., 2007; Wenger-Trayner et al., 2015). Fostering the development of resilience and professional growth as an educator through SaT programs will support the transition from role of student to role of resident.

2.5 Concluding Remarks

This study contributes to the literature on developing SaT programs in medical education curriculum, especially regarding understanding the importance of teacher skill acquisition, educator identity formation, and its impact on the development of confident PGY-1. Although attention to the topic has spanned more than 20 years (Blatt & Greenberg, 2007; Soriano et al., 2010), the further development and implementation of formal SaT programs remains underdeveloped due, in part, to uncertainty with structural continuity (Marton et al., 2015). Without a formal SaT program to support fourth-year medical students in the practice teaching skill acquisition, the success of the 4Y is compromised. Understanding the ways in which a current SaT program at West Virginia University School of Medicine impacts fourth-year medical student

teacher confidence may assist key stakeholders (e.g., administrations, curriculum directors, course coordinators, students) at other medical institutions on addressing and implementing more robust teaching programs to aid in the transition.

3.0 Methods

3.1 Aim Statement

In order to better prepare them for first-year post-graduate residency teaching medical students (PGY-1), 90% of fourth-year medical students (4Y) completing West Virginia University School of Medicine's 10-month Medical Students as Educator (MSaE) course will increase levels of confidence from their current state to very confident in the areas of teaching skill acquisition.[4]

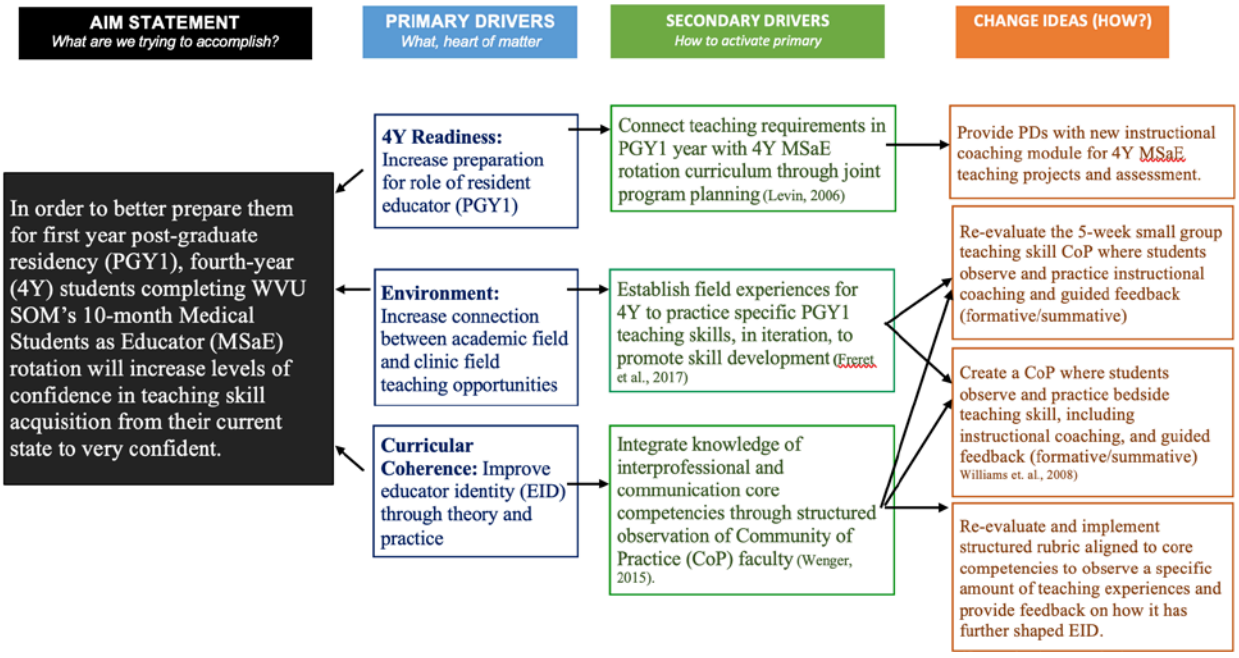


Figure 4: Improvement Science Driver Diagram

[4] Medical Students as Educators (MSaE) is an SaT elective rotation. An "elective" is an integral component of the traditional fourth year curriculum and defined by LCME as "opportunities that supplement required learning experiences and that permit medical students to gain exposure to and expand their understanding of medical specialties, and to pursue their individual academic interests (LCME., 2019, p. 8). At West Virginia University School of Medicine, electives are typically four or two weeks in length and chosen by the student. However, the MSaE elective is longitudinal in that it spans 10-months of an academic year with a minimum of 2-3 contact hours per week with students, synchronously and asynchronously. Therefore, for this this report, I will use the term "course."

Note. This figure illustrates the potential connections for change ideas with three primary drivers for the MSaE course (Bryk et al., 2016; Perry et al., 2020).

In Figure 4, the driver diagram displays potential connections for change ideas with three primary drivers: PGY-1 Readiness (transition with purpose), environment (student teaching experience for skill development), and curricular coherence (integration of theory and practice to improve confidence). 4Y student *readiness*, or preparation for the role of PGY-1, can best be acquired through joint program planning (Levin, 2006). A solid 4Y teacher training program will blend efforts through high-quality clinicians and researchers in both the undergraduate medical education curriculum as well as graduate medical education curriculum.

Curricular balance can be established by integrating theory and practice closely aligned to the PGY1 role with the collaboration of residency program directors. The *environment* is a vehicle for students to observe, practice, and shape their teaching skill. Established courses within the medical school curriculum will provide a firm foundation for the additional student teaching experiences—academic teaching experiences and clinic teaching experiences (Freret et al., 2017). *Curricular coherence* will allow for greater alignment to M4 educator identity (EID) formation through theory and practice by the contexts in which we interact (Jauregui et al., 2019; Wenger-Trayner et al., 2015). Through the MSaE environment, students will be provided with an intensive and extensive activity where learners are deeply engaged within a Community of Practice (CoP) and provided varied teaching opportunities to observe, practice, develop and demonstrate competence (Greenberg et al., 2011; Wenger, 1998).[5]

[5] A "community of practice" or CoP is defined as areas of the occupation in which we identify ourselves (e.g., research, teaching, patient care, special interest groups) with likeminded people and shared interests (Cantillion, et al., 2016; Jauregui et al., 2019; Wenger-Trayner et al., 2015). The CoP within the MSaE course is comprised of pre-clinical and clinical faculty and peers within established curriculum who model proven professional teaching ideals.

3.2 Theory of Improvement

If I want to increase the levels of fourth-year medical student (4Y) confidence in teaching skill acquisition from the current state to very confident, then I need to focus on increasing formal and informal teaching opportunities for students to hone their skills through structured, iterative teaching practice. The best way I can think of doing this is to provide MSaE students with an additional first-year post-graduate residency (PGY-1) student teaching experience of bedside teaching which will be assessed through deliberate iterative practice including bi-weekly journaling and a personal reflective narrative.

3.3 Plan-Do-Study-Act Cycle

The MSaE course will use a *Plan-Do-Study-Act (PDSA)* cycle as the basic method of inquiry to implement change (Bryk et al., 2016). A PDSA cycle (Appendix A) more specifically discusses the specifications related to the aim of the study—including goals, steps, timeline (Appendix B)—as it pertains to understanding overall improvement of intervention through the cycle. The overarching inquiry question that guided this study was: How did formal Students-as-Teacher programs designed to help 4Y students teach effectively better support the transition of 4Y students to PGY-1 teacher? The qualitative methods inquiry question that guided this study was: In what ways did students self-assess and reflect on their performance as new teachers? The change idea in this study included implementation of a teaching module and student teaching experience to improve teaching skill confidence—shadowing a cooperating preceptor, practicing pedagogy independently with junior medical students, and reflecting on teaching approaches with

the most impact on junior learners through journaling (Greenberg et al., 2011). Key questions and predictions on expected results were collected and analyzed during the 12 week PDSA cycle using a qualitative lens (Table 3).

Table 3: MSaE Intervention Inquiry Questions.

Key Questions	Predictions	Data
What did 4Y MSaE student teachers report on perceptions around confidence in teaching procedures while in their student teaching experience?	All 4Y MSaE student teachers would report notable changes from current level of confidence to very confident by the end of the six month teaching experience.	Bi-weekly electronic journaling during the 12-week student teaching experience describing self-reported collective experiences during interactions with learners and preceptor coordinators.
In what ways did students self-assess increased confidence in teaching skill acquisition and reflect on their student teaching experience?	All 4Y MSaE student teachers would increase in confidence from current standing to confident or extremely confident.	Post-Personal reflective narrative at conclusion of 12-week student teaching experience describing approaches implemented.

Note: This table illustrates the PDSA Cycle inquiry questions based off of the theory of improvement aim statement.

A student teaching experience within the MSaE course would require several moving parts: (1) an established course to embed the practice of iterative teaching assessed through core competency based rubrics (Freret et al., 2017); (2) a cadre of exemplary teaching faculty acting as cooperating preceptors modeling teaching skills while 4Ys observe and practice reflexively (Levine, 2006); and (3) no less than 10 weeks in an established course so that students were engaged with deliberate iterative practice followed by observation and reflection (Greenberg et al., 2011). The PDSA cycle (Appendix A) in this study would run over the course of 12 weeks beginning September 2020 through December 2020. The new teaching module on bedside teaching was approximately two hours in duration, provided an overview of teaching EPA1 concepts, teaching to various learner levels, bi-weekly journaling, and

giving feedback to learners (AAMC, 2017; Barron, et al., 2017)[6]. Participants began a 12-week student teaching experience within select established courses.[7] Bi-weekly journaling would provide feedback or check points throughout the PDSA cycle intervention to provide real-time adjustments through action research (Mintrop, 2016). A post-reflective narrative will be given in December 2020 to all 4Y participants.

3.4 Methodology

This section discusses the research design and methodology used for this study. The following sections also provide a detailed description of the participants, measures, research design, procedures, and data analysis for this improvement science methods study.

3.4.1 Plan: Research Design

This study used an improvement science methodology design, which was conducted using a continuous improvement process (Perry et al., 2020). This process included the PDSA inquiry cycle as described above, which relied upon qualitative measures for data collection.

[6] The module content was based off of AAMC Entrustable Performance Activity (EPA1) for Entering Residency—taking a history and performing an exam (AAMC, 2017). There are thirteen EPAs which serve as a toolkit for sequential learning. Medical schools may choose to use the EPAs in their established curriculum as points of proficiency each fourth-year medical student should be able to do before stepping into residency as PGY1.
[7] Physical Diagnosis and Clinical Integration II, Internal Medicine Sub-Internship, Family Medicine Sub-Internship, Surgery Sub-Internship, Pediatrics Sub-Internship, Anesthesiology and select Critical Care electives.

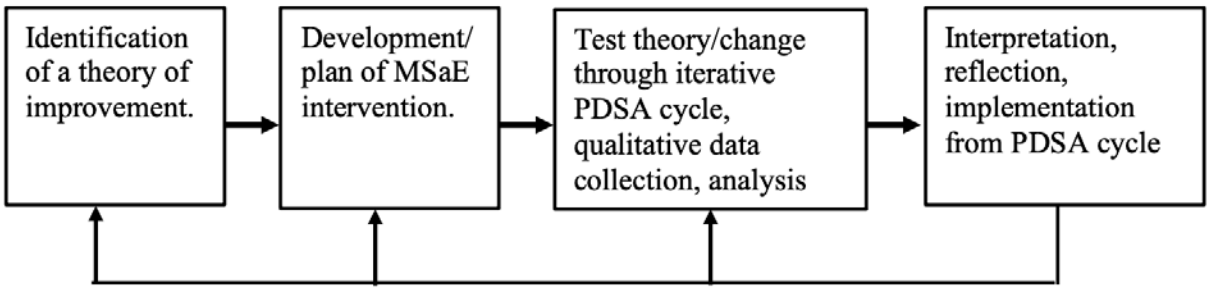


Figure 5: Improvement Science Methodology Design

Note. Improvement Science Design (Adapted from Perry et al., 2020). This figure illustrates the process for an improvement science method design, including the PDSA inquiry cycle.

In Figure 5, the improvement science process began with a theoretical framework, or a theory of improvement from problem of practice inquiry-questions which guided the overall design of the study (Perry et al., 2020). By using an improvement science design, I was able to better understand how the teaching module and student teaching experience shaped increased confidence in teaching skill acquisition.

3.4.1.1 Participants and Sampling

As a non-experimental design, the target participant group of the intervention was 4Y students enrolled in the MSaE course on the Morgantown campus. The use of a non-experimental nonequivalent participant group, with varying levels of teaching skill, would allow for the analysis of data in consideration of a possible relationship between and among those who were in a formal teaching program, including the use of teaching pedagogical practices. The goal was to have all MSaE students complete the entire intervention.

I selected the MSaE course at West Virginia University School of Medicine as the site for the research study. The MSaE course was 10 months in duration where medical students complete learning modules on specific teaching skills in concert with practical application of the skills

(Appendix C). The course has 23 students from three different campuses. For this study, I focused on the twelve (n=12) 4Y students located on the Morgantown campus since they would have the most direct and consistent contact with junior learners and preceptor coordinators throughout the PDSA cycle.

3.4.1.2 Recruitment

A final list of all MSaE course students were pulled from the student services department H Drive in August 2020. MSaE students enrolled in the course were candidates for participation. An Excel spreadsheet was used to track enrolled students, and include the names, and study ID. Any identifying data would be stored separately from survey data in my Cloud: Pitt One Drive / SharePoint site).

3.4.1.3 Informed Consent

In order to reduce coercion and undue influence, all twelve (n=12) participants received an email with information about the study's purpose, timeframe, definitions, and description of consent. The description of consent detailed responses which were confidential and anonymous. There was minimal risk to participants as it was research conducted within normal education practices. The informed consent would detail how the results of the study would only be reported in aggregate form and names were de-identified to ensure anonymity. Informed consent would be displayed on the invitation landing page in Qualtrics© (Appendix I) where they could agree to consent or exit the survey. Participants were advised that they could withdraw any time from the study without consequences in relation to grades or MSaE course tasks.

3.4.1.4 Instrumentation and Materials

For this study, I collected PDSA cycle data in two stages as depicted in Figure 6. Stage I included a qualitative analysis of the bi-weekly electronic journal entries. Participants submitted a minimum of six electronic journal entries over 12 weeks. Journal entries were short in design and used open response from a prompt (Appendix D). At the end of each month, participants received aggregated formative feedback from preceptor coordinators and junior level learners (Appendix E) to support their journal entry reflection. The goal of the bi-weekly journal entries was to provide me with a snapshot of what the learners were revealing about themselves over time during the 12-week PDSA cycle. If the participants taught within a collective community of practice and applied course module instruction with their own formative feedback, then the bi-weekly journal entries would demonstrate evidence of change in participant confidence through teaching skill acquisition. Stage II included a qualitative analysis of individual participant post-reflective narratives. At the conclusion of the 12 week cycle, all participants were provided summative feedback data on their performance (Appendix F) and asked to submit a reflective narrative in which they "self-assessed and reflected on their performance as teachers" by assigning themselves a final level of confidence, supported by a reflective narrative justifying the level and how their teaching experiences had contributed to their level of confidence as an educator (Yoon et al., 2017, p. 413) (Appendix G). The participants would assign themselves a final confidence level scale similarly to the bi-weekly electronic journal entry. Unlike Yoon et al., (2012)'s study where 4Y participants assigned themselves a grade at the conclusion of the course, the modified instrument in this study asked learners for a summative narrative on their progress halfway through the MSaE course. The goal of the post-summary narrative reflection was to provide me with a culminating measure reflecting on the growth process over the 12-week PDSA cycle.

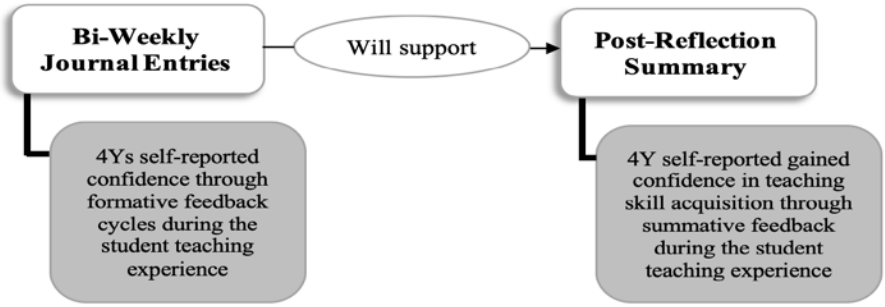


Figure 6: Measurement Stages

***Note*.** This figure illustrates the two stages for measurement being gathered**.**

3.4.2 Do: Data Collection

3.4.2.1 Timeline

After receiving approval from the University of Pittsburgh IRB in September 2020, the researcher requested IRB approval from the PGY-1 institution – West Virginia University. The intervention took place between September 2020 and December 2020 with data collection beginning September 2020. Electronic journal entries were reviewed on a bi-weekly basis. A reflective narrative was administered in December 2020 to all participants at the conclusion of their student teaching experience.

3.4.2.2 Data collection Procedures

The participant data captured was anonymous. Participants used West Virginia University School of Medicine learner management system, SOLE, to complete bi-weekly journal entries. To remove rater bias that would impact the intervention performance data, the bi-weekly electronic journal entries and post-reflection narrative entry were anonymous. Since the MSaE course required the participants to work closely with the researcher in a one-to-one setting, anonymity in

the data collection process ensured there was no judgement in analysis and interpretation between participants. In place of matched pairs, evidence of individual improvement over the duration of 12-weeks came in the form of the post-reflection in December. At the conclusion of the PDSA cycle in December, participants were instructed to click on a password protected email link to complete the reflective narrative in Qualtrics©.

3.4.2.3 Validity and Reliability of Measures

To ensure internal reliability and credibility, I used a qualitative inductive content analysis on deidentified, written journal entries and reflective narratives. I used the practice of open coding. As an expert classroom teacher with certifications in teaching and curriculum development, I consistently use a reflexive stance when I analyzed the data and interpreted themes that emerged. All participants had access to their journal entries and reflective narratives.

Internal validity for the qualitative data was maintained by ensuring that the responses were kept in the researcher's Cloud: Pitt One Drive / SharePoint site and in Qualtrics© (Qualtrics. Provo, 2020). The researcher contacted the MSaE intervention participants via email with a link to complete the reflective narrative in Qualtrics© (Appendix H). The Informed Consent appeared in initial participation email. Bi-weekly electronic journal entries were created, administered, and reported through WVU SoM's student online learner management system, SOLE (SOLE, Morgantown, WV). To ensure anonymity throughout the intervention cycle, participants were not asked to enter their names and the Qualtrics© tools employed the anonymize response function to prevent the collection of any identifiable information "including contact information and IP addresses" (Qualtrics, 2020, para. 1). In both methods, my position was that of participant-observer since I was the director of the MSaE course responsible for the teaching module. Neither my

identity nor my observer activities during the PDSA cycle would be concealed from the participants.

3.4.2.4 Improvement Science Measures

As a guide to understanding the impact of the change idea, this study relied upon improvement science measures: Outcome, Process, Driver, and Balance (Perry et al., 2020). Leading outcome measures would be identified throughout the immediate changes in the PDSA—bi-weekly journaling and post-reflective narrative. Lagging measures would include the improved 4Y confidence demonstrated as a PGY-1, collected after the 10-month period, to determine if improvement has impacted their performance in the role of PGY-1.

Incremental driver measures from the change idea would show an impact on primary and secondary drivers and guided my understanding of change within the curricular system. If participants had an improved understanding of how to apply learned teaching skills in clinic and classroom and were more confident in their teaching, then the newly established teaching experience to improve confidence in teaching had changed. From an improvement science perspective, these formative sources of feedback data were all evidence Il used to see change over time.

Participant narrative reflections served as process data. Bi-weekly electronic journal reflections on applied teaching practice were directly related to the unit of analysis—the participant (Perry et al, 2020). If my aim was to improve teaching skill acquisition, journal reflections would serve as a vehicle to see change in “real time”. Potential change that could disrupt the system might include preceptor resources (i.e., time, technology, evaluation burnout) and 4Y student burnout (i.e., leading too soon without cooperating preceptor guidance). However, the specific process and driver measures described above would help

maintain balance measures throughout established courses.

3.5 Analysis of Data

3.5.1 Study and Act: Analysis and Interpretation

The final phases of the PDSA cycle were to Study the data from the inquiry to draw conclusions and to Act on the findings. Data analysis took place between January 2021 and May 2021 (Appendix B). Similar to the study by Yoon et al (2017), I used a phenomenographical approach to study and analyze the twelve (n=12) MSaE participants' subjective experiences, written in summative reflective narratives, collected during the PDSA cycle. Qualitative research provided me with an explanation for the ways in which students come to understand and make sense of their situations (Merriam & Tisdell, 2018; O'Brien et al., 2014). A phenomenographical lens seeks to understand the multiple different ways in which participants think about processes and outcomes of learning and co-construct knowledge (Barnar et al., 1999; Bergman et al., 2012; Stenford-Hayes, et al., 2013).

I chose to use a phenomenographical lens in the data analysis with the intent to deeply understand an unexamined impact of the MSaE course: the perception around 4Y's confidence in teaching M2s physical exam skills at bedside while in their student teaching experience. To explore their newly formed confidence in teaching, I specifically analyzed the 4Y post self-reflective narrative and how they translated their course experience into application over the 12-week PDSA cycle. Leading up to the post-reflection, 4Ys completed bi-weekly journal entries in order to maximize the 4Y student teachers' reflection on their teaching experiences and, thereby, illuminate

how they transformed their student teaching experience into demonstrated confidence in teaching skill acquisition. The phenomenographical study helped me see in what ways 4Ys wrote about gained teacher confidence in practice.

Similar to authors Yoon et al (2017), I felt the written narrative would reveal more than semi-structured interviews or focus groups. Conception of the phenomenon could change monthly through bi-weekly journal entries where participants actively described their teaching experiences and newly gained skill. Bi-weekly journaling and a post reflective narrative could point to competency development over time. While improvement science was the methodology in which I visibly saw change within the MSaE course, through a theory of action and intervention design, using a phenomenographical lens for qualitative data analysis provided me with a deeper understanding of the shared experiences through the community of practice (CoP) where 4Ys are deeply engaged in teaching at bedside with junior learners and expert faculty.

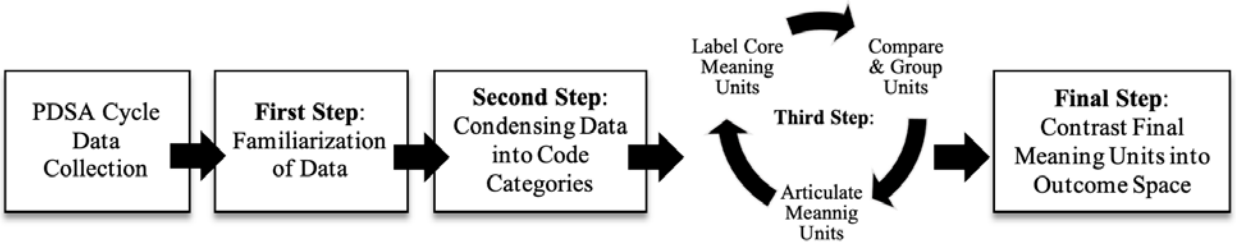


Figure 7: Phenomenography Analysis

Note. Phenomenography Analysis (Adapted from Stenfors-Heys et al., 2013.) This figure illustrates the analysis process used within the Study portion of the PDSA cycle for this study.

I collected all anonymous participant post-reflective narratives submitted through Qualtrics© by the end of December 2020. Similar to Yoon et al (2017), I used a qualitative inductive content analysis with twelve (n=12) deidentified individual reflective narratives using open coding while the content was analyzed. First, the open-ended journal entries completed by the 4Ys were reviewed as one set over several different sessions. During each session, Code

Categories were noted in Single Word Descriptions and In Vivo codes—phrases of words by the participants (Miles et al., 2020). I constantly compared the new reflective narrative with the previous one to identify new codes until I reached saturation.

Next, code categories were condensed through an iterative procedure to compare, group, and label the meaning units into 12 Meaning Units (Stenford-Hayes et al., 2013). The meaning units were discussed with an approved faculty advisor, in multiple rounds, until a consensus was agreed upon for the final Core Units. I repeated the pattern coding process to explore the variation in the 4Ys conceptualization of their individual experiences with the intervention (teaching at bedside) and how their experiences fostered development of medical teaching skill. The final step in the analysis involved investigating the internal relations between each category of understanding and their internal relations to each other in order to produce the "outcomes space" (Larson & Holmstrom, 2007, p. 58; Stenford-Hayes et al., 2013, p. 267). By exploring the variation and focusing on the quality of the fourth-year medical student's experiences, I was able to tailor future MSaE 4Y teaching experiences that addressed their learning needs in preparation for the role of PGY1. Analyzing the qualitative data along with the project plan involved triangulating the findings with the initial inquiry questions and hypotheses. A coding manual was kept on the researcher's Cloud: Pitt One Drive / SharePoint site.

Given the implementation detailed above, the proposed PDSA cycle with phases was provided:

1. Plan
    a. Development – (7/1/2020 through 8/1/2020) – The researcher gathered baseline data from pre-existing MSaE course data, drafted proposal overview for

dissertation committee including plan, methods, measures, resources, and timelines. The researcher created summative reflective narrative in Qualtrics©.

b. Proposal – (8/1/2020 through 9/2/2020) – The researcher finalized the proposal with advisor, prepared and held a virtual proposal overview with Dissertation Committee members, and completed an IRB.

2. Do

a. Implementation – (9/1/2020 through 12/1/2020) – Following the approval of the proposal and IRB application, project implementation began. Recruitment of participants only included enrolled students in the MSaE course. The researcher informed MSaE course students of participation; informed consent and instructions were provided to 4Y participants via Qualtrics©. The participants completed the intervention comprised of bedside teaching module and student teaching placement, and reformulated intervention modifications or "pivots" based on bi-weekly electronic journals.

3. Study

a. Track and Adjust – (10/1/2020 through 12/1/2020) – The researcher tracked electronic journal data and did additional tweaks as needed throughout the project.

b. Gathered and reviewed data, ran analysis

c. Drafted ISDiP chapters

4. Act

a. Shared Results – (2/1/2021 through 5/1/2020) – The researcher prepared and delivered data with advisor as needed.

b. EdD Requirements – The researcher finished ISDiP capstone, scheduled and defended with Dissertation Committee.

3.6 Concluding Remarks

Adding a new teaching module and student teaching placement for 4Y students in the MSaE course is a realistic, engaging, and feasible intervention for WVU SoM that can also be implemented virtually. While the issues faced by the WVU SoM in trying to recruit 4Y students into the MSaE course are far from being resolved, strides in attempting to find plausible solutions are slowly increasing. The intervention has the potential to enhance the MSaE longitudinal teaching course and improve confidence in 4Y student teaching and assessment skill acquisition before stepping into the role of PGY-1 educator. A thorough analysis of the data will determine changes that are needed to the intervention. Additional future iterative cycles will incorporate the changes with the implementation across multiple campuses with more students and cooperating preceptors. In this, the MSaE course will build capacity to further develop ways in which 4Y students can practice teaching skill development.

4.0 Findings

4.1 PDSA Results

The purpose of this study was to examine the impact that the MSaE student teaching experience improved fourth-year medical students' (4Y) confidence in their teaching skill with junior learners. The study also sought to explore how 4Y student teachers reflected on and self-assessed their performance as new teachers practicing specific teaching skills. This analysis uses insights derived from qualitative data to help explain the results. In this chapter, the results and findings of the qualitative analysis, including scaled items from journal entries and reflections conducted in this study, through the PDSA Cycle intervention, are presented. This chapter is divided into two sections:

- Stage I, bi-weekly journal entries, qualitative analysis with a phenomenographical lens.
- Stage II, post-reflection summary, qualitative analysis with a phenomenographical lens.

In each stage, subsections were created to reflect the research questions that guided the study, which will assist in the presentation of the study's results and findings.

4.2 Stage I: Bi-Weekly Journals

4.2.1 Sample Population Descriptive Statistics.

Upon beginning the MSaE rotation in July, participants were asked to answer six demographic questions. Three of the questions did not yield data useful or pertinent to the research results in the analysis, so they are not further discussed and were eliminated from the representation of the demographics. Responses to the remaining three questions that are the subject of this Stage I analysis are listed in Table 4.

Six (50%) of the 12 participants had prior teacher training as a peer tutor or a classroom teaching assistant. The remaining 6 (50%) of the 12 participants did not have any prior teacher training. One of the participants with “6-10 years” of prior teaching experience had been enrolled in a graduate level course on teaching pedagogy in the higher education classroom but had not practiced teaching clinical pedagogical skill development. This participant’s journal posts had notably much more depth in how he strategically connected content to adult learning. Other participants in the “3-5 years” range noted prior teacher training that included informal workshops or teaching assistant tutoring sessions focused on classroom management skills such as goal setting and learner engagement. These data indicate a cohort of 4Ys with heterogeneity in years of experience and teaching skills.

Table 4: Demographics of Participants

Demographic Data	*n* (%)	Demographic Data	*n* (%)
Gender		Years Teaching and/or Tutoring	
Female	5 (41.7%)	0 years	3 (25.0%)
Male	7 (58.3 %)	3-5 years	6 (50.0%)
		6-10 years	3 (25.0%)
Received Prior Teacher Training			
Yes	6 (50.0%)		
No	6 (50.0%)		

4.2.2 Intervention Inquiry Question I

To answer the first qualitative research question for the study, "*What do 4Y MSaE student teachers report on perceptions around confidence in teaching procedures while in their student teaching experience?*" I used a phenomenographical approach, as described in Section II of the ISDiP, to analyze the data and identify meaning units which related to 4Y participant confidence in teaching. The results are presented below in detail.

"Rate Your Level of Confidence Teaching This Week" Journal Instrument. I used periodic self-assessment recorded in journal entries to gather data to inform this research question: "How Would You Rate Your Level of Confidence Teaching This Week?" This journal instrument is comprised of three items:

(1) date of post,

(2) body of post,

(3) rating level of confidence

Prior to the phenomenographical analysis with data from bi-weekly journal posts, I reviewed the journal data to identify overall trends from participant responses. Twelve (100%) participants completed the bi-monthly journals; As represented in Table 5, there were 58 (80.56%) journal posts submitted. Not all participants were able to submit two posts per month due to

schedule inconsistencies such as unforeseen graduation requirements and COVID-19 restrictions temporarily removing 4Ys from the clinical teaching environment experience and, therefore, not able to entering a journal post.

For each journal post, participants were instructed to rate their level of confidence in teaching with one of the following response choices:

(1) “Not confident,”

(2) “Somewhat Confident,”

(3) “Confident,”

(4) “Very Confident.”

In Table 5 none of the 4Ys responded in any of their journal posts with “Not Confident.”

Table 5: Descriptive Statistics for 4Y Bi-Weekly Journal Post Levels of Confidence Per Month

Item Monthly Journals	(1) Not Confident *n* (%)	(2) Somewhat Confident *n* (%)	(3) Confident *n* (%)	(4) Very Confident *n* (%)	Mean	Total
September	0 (0%)	3 (15.0%)	11 (55.0%)	6 (30.0%)	3.15	20 (100%)
October	0 (0%)	0 (0.0%)	9 (40.9%)	13 (59.1%)	3.59	22 (100%)
November	0 (0%)	1 (6.2 %)	5 (31.3 %)	10 (62.5 %)	3.56	16 (100%)
Total	0 (0%)	4 (6.90%)	25 (43.1%)	29 (50.0%)	3.43	58 (100%)

Most participants’ responses over the course of three months were reflected within the “confident” to “very confident” range showing an upward trajectory towards increasing confidence throughout the student teaching placement. The highest levels of confidence were reported in the ‘November’ journal posts with (62.5%) “Very Confident,” and the lowest levels of confidence were reported in the ‘September’ journal posts with (15%) “Very Confident”. There is a small dip in confidence choice, specifically for September and November, due to participants selecting both

‘Somewhat Confident’ and ‘Confident’ more than once for journal entries which will be further explained in Section IV.

The 4Y participant’s open-ended journal posts described teaching approaches the students implemented over the duration of the three months. Four meaning units were identified:

- ‘Classroom Management Pedagogical Skills’
- ‘Clinical Bedside Pedagogical Skills’
- ‘Managing the Psychosocial Environment’
- ‘Educator Identity Formation’

The following sections will elaborate on the meaning units including a sample of participant comments identified with a journal number (J) assigned.

The three common meaning units that reoccurred in September were ‘Classroom Management Pedagogical Skills,’ Clinical Bedside Pedagogical Skills,’ and ‘Managing the Psychosocial Environment.’ Specific quotes from the journal entries provided by the 12 participants, in relation to these meaning units, are listed in Table 6. ‘Classroom Management Pedagogical Skills,’ the first meaning unit, relates to the participants’ knowledge of matters such as pacing, time management, having an instructional plan, breaking down broad topics, and setting learner expectations in the learning environment. All 4Ys stated their need to improve or work on this particular area. ‘Clinical Bedside Pedagogical Skill,’ the second meaning unit, relates to participants’ knowledge of matters such as taking a detailed history and completing a thorough physical examination. All 4Y participants specifically identified the method and practice of teaching learners how to complete a thorough history through collaborative and organized learning. One 4Y wrote:

> This meeting was to go over the ID, Chief Complaint and HPI. ... It was virtual. This is the first and foremost challenge at this time. While not as problematic as for learning the physical exam, interacting over Zoom or any other digital platform removes so much of human communication, particularly in timing (as it becomes very easy to accidentally talk over people), so establishing a give and take is difficult. I thought that the best way to handle this was when ... (the leader of the group) took charge and gave instructions in well outlined chunks with CLEARLY DEMARCATED areas for student response ...Yes, this removes some of the "collaborative" learning as back-and-forth exchange becomes limited, but it optimizes interactions and makes the best of an awkward situation. (4Y, J4, Date 8-21-20)

'Managing the psychosocial environment,' the third meaning unit, was an area in which 4Ys demonstrated newfound confidence. Psychosocial behaviors frequently included sharing empathy, creating a safe learning environment, and maintaining rapport through interpersonal and communication skills with the junior learners. Establishing themselves in their new role—the student teacher—while developing and shaping core teaching skills during the teaching experience were especially prevalent throughout the 4Y monthly journals.

'Educator Identity Formation,' a fourth meaning unit, predominated during the October journal posts, as shown in Table 6. Several "confident" journal entries touched on the 4Ys self-awareness with how they saw themselves in the learning landscape. A few students describe the process of negotiation between self-as-student and self-as-teacher. Descriptions included personal professional goals to work on such as ensuring equity in learning between themselves and junior learners with the intent to change their behaviors. Other descriptions were external factors such as student feedback to implement direct change. One 4Y wrote:

> Overall I see myself often thinking back to the feelings I had as a student and how those impacted my learning experience. I remember what types of interactions gave me positive feelings and allowed me to ask questions freely and which interactions made me feel like I shouldn't ask anything. I try to re-create the positive interactions with my students, and I think it has been working well so far ... I want to maintain my introspective teaching style and I want to be perceived as willing to make time to teach my students and patients as opposed to not having enough time/making them feel like I'm doing them a favor." (4Y, J35, Date 11-15-20)

A number of 4Ys continued to reflect on application of 'classroom management pedagogical skills' which informed and influenced practice in 'clinical bedside pedagogical skill' acquisition. 4Ys ability to implement individualized instruction through adaptive teaching methods (based on feedback and based on their earlier journal posts) reflected with the 4Ys gains in confidence in their teaching skills. One 4Y wrote:

> We covered the last piece of the "verbal" history and discussed the ROS. Before we started I asked what worked well for them and what helps them learn best. They agreed that when I probe them a question BEFORE explaining a topic and asking what they know and then building on that is most effective. I had a feeling that was working well the past time I met with them and I am glad they agree. From now on I am going to try to use that teaching method in order to best suit their teaching style and maximize what they learn from this preceptorship. (4Y, J6, Date 10-13-20)

Parallel to the meaning units 'classroom management pedagogical skill' and 'bedside teaching pedagogical skill' is the reoccurrence of establishing grounded trust, a core strategy for the meaning unit of 'managing the psychosocial learning environment'. Examples of establishing

grounded trust included giving feedback which is supportive, not harsh, and setting a tone for learning that is empathetic and free of judgment.

The journal entries in November presented a greater shift in focus towards the meaning unit of ‘educator identify formation’. Several participants wrote about their ability to shift the power differential and see themselves as an educator, no longer a peer, a natural progression. One participant wrote about self-actualization indicating their ability to confidently navigate through their newly formed educator identity. Navigation included connecting with learners in a comfortable learning environment, talking about shared experiences “in their shoes,” and making time for them to ease anxiety and bring a sense of calm in the learning environment. One 4Y wrote:

> I have continued using questions to gauge where my learners are at in a non-threatening way. I additionally sent my learners some of my own notes and cheat sheets that I used when I was in their shoes to most efficiently learn material. ... This is a particularly stressful time for MS2s, and I try to ease some of their stress by ensuring that I am very direct and practical in my answers to their questions. ... I try to specify actual study strategies that I used to reduce my stress and make myself more efficient (condensing material, prioritizing various lectures, etc.,). The students seem to like this method as well. (4Y, J25, Date 11-6-20)

An interesting finding in the November journals was the projection of confidence by 4Ys in relaying what they know about content, such as the physical exam, and recognizing that variations may exist between the 4Ys own teaching and that of the preceptor coordinator in the specifics of how to move through a physical exam, a procedural teaching skill. One 4Y student wrote:

> I observed one student while she performed her history on a patient who was hospitalized and did much better observing this time than previous times. I found myself taking on more of a teacher role instead of thinking about what I would want to ask the patient at a MS4 level. This helped me focus more on what basics she was missing or asking correctly to the patient ... provide better feedback at her level as a MS2**.** I was somewhat confident teaching this because I feel like different people have different styles and expectations when it comes to physical exam. I found myself more often asking the [coordinator] preceptor if she thought what I was teaching was to her level of expectedness. ... I think the teaching of physical exam skills will be an area where I learn more of how best to teach from the [coordinator] preceptor, whereas with the history skills I felt confident straight away. (4Y, J40, Date 11-12-2020)

4.2.3 Stage I Summary

In Stage I of the research, I was able to demonstrate the key meaning units related to 4Ys' perceptions of their teaching. As it can be seen, 4Y participants reported progressively and increasingly confident perceptions around the ways in which they actively applied varied teaching strategies through iterative teaching with junior learners and preceptor coordinators. For the most part, the monthly journal entries consistently reflected the innermost beliefs, desires, and wonderings about the ideals of teaching, shifting the power differential, and becoming a teacher.

Table 6: Description and Examples of Meaning Units for Intervention Inquiry Question 1

Meaning Unit	Description of Meaning Unit (D) and Examples (E) of Statements from 4Y Journals September (1), October (2) and November (3)
1. Classroom Management Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence in classroom management skills with junior learners. E1: "One big thing I should work on is sticking to a set agenda and covering topics in a timely manner. I have a tendency to run over time however the students seemed to be ok with this as long as the information was helpful." E2: "It's important to have these in-person learning experiences because you can make adjustments as you go and really learn by doing. I was able to provide feedback right away and help them recognize small changes that could really aid in their H&P skill growth." E3: "We reviewed previous material and went over new portions of the physical exam. ... They were able to practice skills they had previously learned and expand upon them with new material. As the patient, I knew where I wanted to go with my teaching points and had mapped out specific learning issues I wanted to cover."
2. Clinical "Bedside" Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence initially teaching clinical procedural skills. E1: "We taught HPI, PMH, FHx, and SHx ... these are relatively simple to teach but take a lot of work to develop clinically to do it well. This comes with practice and close observation of the students while they are practicing these histories on patients." E2: "I learned to apply the skills of observation with minimal interruption followed by discussion outside the patient's room. I believe this to be the most effective method of teaching at this stage because students need to learn how to navigate a patient history on their own." E3: Today we met in STEPS to teach the M2s the heart and lung physical exam as well as review ultrasound. This went very well as our students are very comfortable with us now and are able to ask questions when they don't understand. We were able to assess their weaknesses and help them learn the exam the way that they wanted to learn it, and it felt like an effective session. Now the challenge will be ensuring they retain their new knowledge, which will come with practice and observation
3. Managing the Psychosocial Learning Environment	D: 4Y teachers' beliefs on psychosocial learning environment aspects like interpersonal & communication skills and establishing a safe learning environment. E1: The approach for teaching at this stage has the strengths of reflective learning, observational learning by watching the other student take a history, and allowing a student to develop his own history taking style with minimal interruption ... allowing the students to discuss their performance outside the patient room is a professional, and comfortable environment to address their concerns and questions about the experience." E2: "I try to be 'down to earth' with the students. That's how I always have been and it makes everyone feel comfortable and able to ask any question because I try to be as open and welcoming as possible. I want everyone to be comfortable." E3: "The skill I've been working on is how to make a comforting learning environment free of judgement, because if the learner is anxious about not getting everything "perfect" they may not be able to truly be present in the lesson. I feel like this sort of rapport building will be helpful to keep in mind with future learners and patients."

4.	Educator Identity Formation	D: 4Y teachers' beliefs surrounding confidence in their educator identity formation. E2: "As I teach more, I feel like I'm gaining more confidence in my teaching style as well. ... I always review the preceptor manual and the goals for that day prior to the meeting... try to look back at my own cheat sheets and mnemonics that I want to teach that day as well." E2: "... I am learning more and more to focus on teaching and observing rather than thinking of what I would do as a student. This is becoming much more natural and I find it easier to observe their skills." E3: I skimmed the surface of the [physical] exam too quickly and ... I then corrected myself and discussed the exam further in as much detail as possible. I appreciated that they [students] were taking notes while I talked which made me feel I was contributing to their education."

4.3 Stage II: Post-Reflection Summary Narratives

In Stage II of the study, the findings were able to answer intervention inquiry question two and the overarching research question that guided Stage II of the study. Below, each section details each question with their respective findings.

4.3.1 Intervention Inquiry Question #2

To answer the second research question for the qualitative component of this study, "*In what ways do students self-assess increased confidence in reflections on their student teaching experience?,"* a similar analysis was done as described in Stage I and the same four meaning units were identified. The results are presented below in detail.

"Assign Yourself a Final Confidence Level as a Student Teacher" Instrument. Prior to the phenomenographical analysis with data from the post-reflection summary narratives, I reviewed the reflection data to identify overall trends from participant responses. 11 (91.7%) participants completed the post-reflection summary; one (1) participant did not complete the summative narrative.

For the post-reflection summary narratives, participants were instructed to rate their final level of confidence in teaching with one of the following response choices:

(1) "Not confident,"

(2) "Somewhat Confident,"

(3) "Confident,"

(4) “Very Confident.”

As represented in Table 7, for all of the post-reflection summary data, none of the participants’ responses were “Not Confident” or “Somewhat Confident.” The same four meaning units in the journal posts emerged within the summary narrative material including a sample of participant comments identified with a summary number (S) assigned.

Table 7: Descriptive Statistics for Post-Summative Reflections Levels of Confidence in December.

Item	(1) Not Confident *n* (%)	(2) Somewhat Confident *n* (%)	(3) Confident *n* (%)	(4) Very Confident *n* (%)	Mean	Total
December Reflection	0 (0%)	0 (0%)	5 (45.45%)	6 (54.55%)	3.55	11 (100%)

These 4Y reflective summary narrative data support the findings and feelings revealed throughout students’ journal posts and describe the impact of the MSaE elective on their personal growth. Students describe in detail how they became more confident in their teaching through iterative practice of ‘classroom management pedagogical skills’ and ‘clinical bedside pedagogical skills’ with junior learners. Iterations involved weekly deliberate preparation and organization of lesson material and implementation of varied teaching methods in order to scaffold content from previous teaching sessions. In a different entry, a 4Y participant said:

> My entire perspective on the importance of being deliberate about learning how to teach has changed ... I now know that much of our role as future physicians involves educating both patients and upcoming medical students/residents. In the past, residents have often been expected to simply “pick-up” the skill of teaching while on rotations. ... I realize how important it is to move to a more structured and deliberate approach to teaching residents and physicians how to teach. Teaching is inherent to our job as physicians, ... I could sense my confidence growing as I progressed through the course and got practice

with methods like the 1-minute preceptor model as well as giving feedback. As I learned the theories behind various teaching styles and the idea of “learning your learner,” I could feel myself experimenting with different methods. ... we were given the tools to learn about the science behind why different teaching methods work, but we were also given so much flexibility to truly develop our own style and confidence. (4Y, S01, Date: 1-09-2021)

Feedback given to the 4Ys from their preceptor coordinators and feedback given to the 4Ys from their junior learners influenced confidence in clinical and classroom pedagogical skill development, whether verbal or written in a monthly performance narrative. 4Ys descriptions of positive feedback included affirmations of being “helpful” or “appreciated” in their practice with specific examples of how it was demonstrated which also lent itself to the ‘educator identity formation’ meaning unit. In another entry, a 4Y participant said:

> My confidence in teaching has come from multiple sources. One large part being from my feedback from my supervisor [cooperating preceptor] and junior learners. My supervisor [cooperating preceptor] stated in my first feedback that I was "very confident" when teaching. During the first month, and especially first session, I did not feel super confident. However, my supervisor [cooperating preceptor] noted that I was very confident and that I supplemented my teaching with helpful personal experiences. Knowing that I came off as confident and helpful to others, helped me gain that confidence in myself as an educator. I have also been very pleased with my feedback from my junior learners. They report in their feedback that I give helpful tips for clinical rotations, helpful feedback for improvement on their write-ups, words of encouragement, and create a comfortable environment for them to ask questions. These comments truly make me feel as though I am being helpful and that my learners are gaining something from my teaching, which in

turn helps give me confidence that I am being a successful educator. (4Y, S06, Date 1-06-2021)

‘Managing the psychosocial environment’, by relating to learners and establishing trust, also influenced the development of confidence as teachers in the 4Ys. The 4Y (still a learner) sees him/herself as a former student who has assumed the role of professional practicing educator yet still shares a sense of connection from having recently trod the educational path of the current novice learners they are teaching. Most participants wrote how adapting to their learners’ needs, using personal examples of successes and missteps as shared lived experiences for meaningful connection, is the most important part of becoming a teacher. In another entry, a 4Y participant said:

> I think the most confidence inspiring aspect of the MSAE rotation has been finding my niche. I think is one of the most important things an educator can learn (i.e. how do I convey what I know to someone else and make them understand why its (sic) important for them to learn it as well). For me this has been to share my prior experiences that they can relate to (ex. avoid these mistakes and pitfalls that I made when I was in your shoes, they love to test this on the OSCE, this is the way you are taught in class but in clinical medicine it's done very differently, etc). This provides me with a unique angle that I can use to compliment what my preceptors are co-teaching. It furthermore makes me feel like the things I'm teaching matter and gives me a sense of agency in my students' education. (4Y, S03, Date 1-07-21)

4.4 Stage II Summary

The main factors for gains in overall confidence result from the repetitious practice of teaching clinical bedside pedagogical skills, classroom management pedagogical skills, and managing psychosocial environment in order to support professional educator identity formation for the 4Ys. In their reflections, the 4Ys also include that their greatest boost in confidence as a new teacher comes from a reciprocated appreciation for teaching and learning from junior learners.

4.5 Concluding Remarks

In summary, the two components of data supporting this study included: 1) ongoing bi-weekly reflective journal writing and 2) a final summative narrative reflections. All of the participants indicated in their journal entries (1) and in their final summative narratives (2) that their student teaching experience within the students-as-teachers course equipped them to evaluate the strengths and weaknesses of the teaching methods and strategies they used. They also indicated they gained a greater awareness of the successes and missteps they had with establishing a positive learning environment and determining the most appropriate teaching plans for their learners. It is important to note that rich qualitative data and the 4Ys' growing understanding of the definition of a confident teacher helped elucidate features of a confident teacher through the qualitative components.

5.0 Discussion

Section IV provides a summary of the study—the overall key findings from the data and its implications and relationships to the problem of practice, system, driver diagram, and existing literature—as well as how the key findings provided insight as to the areas that should be considered for future improvement science research. The section is divided into four parts:

- summary,
- key findings and implications,
- limitations, and
- future research.

The summary reviews the foundation of the study such as the purpose, the current problem of practice, the methodology that was used, and the significance of the study. The key findings and implications section provides an explanation for the results presented in Section III while also making the connections between the results of the study and its alignment with the review of the system and literature examined in Section I. The overall limitations of the study will also be discussed in this section. Finally, the future research section will outline possible improvement science studies or solutions to consider as areas of interest to further the research being conducted on medical student teacher development.

5.1 Summary

Since one-third of residents teach within the first year of residency (Bing-You & Sproul, 1992; Kloek, et al., 2016; Soriano et al., 2010), the need for research and medical school attention on how to teach and support first-year post graduate resident teachers (PGY-1) is critical. Substantial literature describes how much residents can complement the teaching contributions of experienced clinical faculty. The fact that PGY-1s are closer to the student experience within the medical hierarchy allows them to empathize with medical students (Blatt & Greenberg, 2005; Freret et al., 2017; Dandavino et al., 2007). The literature supports the idea that professional development programs can influence teacher skill development and preparedness for residency. I recognized a need to further investigate the ways in which a students-as-teacher (SaT) course can support the transitions of medical students into their expected roles as PGY-1s. Furthermore, I recognized a need to examine the implications of a SaT course on the student teacher as a way to address the problem of practice discussed in Section I. The aim of this improvement science study was to examine the impact of the change idea—the MSaE student teaching experience—on 4Y participants' improved confidence in teaching skill acquisition. The change idea was leveraged by the design of a physical clinical teaching field experience for the 4Ys to practice within. The study also sought to explore how 4Y student teachers reflected on and self-assessed their performance as new teachers practicing specific teaching skills, which is seen in the literature to be a factor that can impact teaching success in residency (Dandavino et al., 2007).

Through this study, I explored fourth-year medical students' confidence in teaching skill development with written reflections in two separate phases:

- Phase I was used to collect bi-monthly journal entries, which were then analyzed, in order to identify ways in which fourth-year medical students think about teaching while practicing in the clinical teaching field experience.
- Phase II was used to collect a summative narrative reflection on their teaching and learning experiences in the MSaE rotation after completion of the teaching field experience.

Identical to the study by Yoon et al. (2017), the 4Y participants were at a point in their medical school curriculum where independence in practice as future physicians is of the utmost importance. Therefore, a medical school curriculum primarily of student-chosen electives, which holds most value for the individual 4Ys future career pathway, are central to their growth and development as physicians and educators by shaping practice-based learning skills (Lyss-Lerman et al., 2009) and forming educator identity discovery (Goldie, 2012; Jauregui et al., 2019; Yoon et al., 2017). Since the literature on teaching readiness or preparedness points to the benefits of how a formal SaT course (with teaching field experience) can impact matters such as educator identity formation and practice-based learning skills (Levin, 2006), it was important to further investigate how the 4Ys interpret their experiences.

5.2 Key Findings and Implications

In this section, the key findings and implications are broken down by the results discussed in Section III. An in-depth explanation is provided as to the connection between the findings, the review of the literature in Section I, and its role in understanding implications in the area of medical student teaching as a transition to a PGY-1.

5.2.1 Confidence in Teaching Skill Development

This study was rooted in the interest of identifying the ways in which medical student teachers increase confidence in teaching skills development from a formal SaT course teaching field experience. As previously discussed, 'teaching skills' are those necessary to communicate ideas around a specific subject while working with learners (and patients) in a clinical or classroom teaching setting (Marton et al., 2015; Rana et al., 2017; Soriano et al., 2010).

Overall, the study data captured 4Y participant perspectives on how their own evolution of teaching skill acquisition influenced their confidence as new teachers. The bi-monthly journal posts provided me with a series of snapshots into their personal and professional growth while in the teaching field experience—the educational classroom landscape (Jauregui et al., 2019; O'Keeffe & Paige, 2020; Wenger-Trayner et al., 2015). As stated previously in Section III, none of the 4Ys responded in any of their journal posts with "Not Confident." A possible interpretation of this finding is that 9 (75%) of the participants had previous teaching or tutoring experience represented in Table 4. A second possible interpretation of this finding is that the 4Y participants were mostly co-teaching with an expert preceptor coordinator indicating an additional level of support in a safe-to-fail teaching environment. Two of the participants marked 'Somewhat Confident' and 'Confident' in one journal entry. The reason for the multiple selections was in the open design of the journal entry—there were no restrictions to how many choices could be selected. Additionally, participants who selected more than one choice described how they felt confident in their gained skill knowledge but felt somewhat confident in their presentation style when compared with the preceptor coordinator.

The summative reflective narratives provided me with a larger picture, a "wide lens" reflection, of their experience within the educational classroom landscape of practice gaining

greater confidence (Jauregui et al., 2019; Wenger-Trayner et al., 2015). Similar to the data discussed above, most participants' responses over the course of three months were reflected within the "confident" to "very confident" range showing an upward trajectory towards confidence throughout the student teaching field experience. These data, along with supporting qualitative comments, would suggest that participants adjusted appropriately to their roles as student teachers iteratively practicing teaching. There was no significant difference between the ways in which the 4Ys wrote their journal post as "confident" verses "very confident" or how much they wrote.

The findings revealed four meaning units for subsequent focus:

- 'Clinical Bedside Pedagogical Skills'
- 'Classroom Management Pedagogical Skills'
- 'Managing the Psychosocial Environment'
- 'Educator Identity Formation'

Although identified as distinct meaning units, these four are clearly interrelated and define the novel, iterative, and safe-to-fail nature of a formal SaT course with teaching field experience. The interrelatedness of these four meaning units suggests how it is distinguished from informal teaching courses. These aspects make the SaT course high yield for 4Y student teachers and curricular designers.

5.2.2 'Clinical Bedside Teaching Pedagogy.'

As predicted, 4Y participants wrote about their gains in confidence through iterative application of 'clinical bedside pedagogical skills.' It was not surprising that many 4Y participants described starting out unsure of how to be effective teachers and not yet trusting their instincts with learners. For example, many 4Ys described initial challenges in the clinical

learning setting, virtual and in person, which were exacerbated by the COVID-19 pandemic. Not only was it difficult translating a bedside teaching skill over the virtual setting but also complex in navigating their own understanding of teaching practice and adaptability. Teaching at bedside (in the clinical setting) is a key activity of physicians on a daily basis, and it requires a series of small incremental transfers of knowledge, viewpoints, and skills (Haber et al., 2006). Exposure to clinical bedside pedagogical skills and techniques should be in an environment which allows iterative practice for medical student teachers to practice and gain greater confidence in their skill. Erie et al., (2013) explain how their SaT program allows for 4Ys to spend over 200 hours practicing teaching, which is atypical for many SaT programs across the United States, and that 4Ys felt significantly more prepared for residency-related teaching because of the teaching experiences provided. Many 4Y participants in this study stated early that they felt prepared or 'confident' in their ability to discuss the learning objectives (e.g., review differential and presenting complaints) but lacked confidence in the approach with junior learners at the patient's bedside. The ability for 4Ys to observe their coordinator preceptor's interactions with junior learners and practice their approach to teaching by modeling and repetition helped increased confidence in teaching skill development. Given that more teaching opportunity can improve student teaching improvement, more research should be focused on such initiatives.

Despite 4Y participants having rated themselves high at either 'confident' or 'very confident' on the acquisition of bedside teaching skill development, uncertainty around how best to teach clinical bedside skills was made evident through monthly journal posts explaining a lack of confidence. Over time, many 4Ys felt better able to determine what they could teach about the clinical learning setting within their control and relied less upon the supportive feedback of the coordinating preceptor to redirect any uncertainty or gaps in teaching plans. The literature

supports this finding in which the collaborative efforts of the community of practice within the context of the MSaE rotation—including an expert coordinator preceptor and 4Y peers—is important to teaching skill acquisition (Jauregui et al., 2019; Wenger-Trayner et al., 2015). Here the coordinator preceptor, with whom the 4Y co-teaches with, can share teaching experiences and lessons learned, negotiate their understanding of best teaching practices, and build on existing knowledge about clinical teaching. These data may account for the increased rating levels of confidence in September.

5.2.3 'Classroom Management Pedagogical Skills.'

A fundamental part of teaching, for novice to expert educators, involves the attainment of 'classroom management pedagogical skills' and discerning where they fit within practice. This action involves knowledge of basic teaching concepts such as time management, agenda setting, and creating a lesson plan. If we look to the research by Blanco et al., (2014) regarding the value of exposing student teachers to basic concepts of teaching and learning, the findings reveal the teaching field experience as important to practical application of 'classroom management pedagogical skills.' Several 4Y September journal entries focused on the importance of establishing classroom norms and expectations for learning during their first teaching session. One set of "norms" included a defined agenda for 'clinical bedside teaching pedagogical skills' acquisition making it more effective and efficient. For example, when 4Ys saw their junior learners accurately completed bedside contextual learning goals through role-play ('clinical teaching pedagogical skill'), they became more comfortable with providing less direct instruction ('classroom management pedagogical skill') in the presence of the patient, thus allowing the learners to have more autonomy. As a result of this practice, many 4Y participants' journals

began to demonstrate a logical relation between understanding clinical and classroom pedagogical skills where both are parallel to each other in practice.

These findings are less surprising if I consider the interrelatedness of both clinical and classroom pedagogical skills in teaching practice within the SaT course. Bandali et al. (2016) found that greater confidence in teaching among 4Ys was a result of additional "multi-source" opportunities, such as clinical teaching skills and classroom teaching skills, to practice teaching skill enhancement (p.2). In fact, almost all 4Ys identified "having a clear plan for teaching and learning expectations online" as a reinforcement of their confidence in their 'clinical bedside pedagogical skill' acquisition. One 4Y summary narrative noted the student's growth in confidence by becoming "better teaching on the spot and without materials present" after three months in the teaching field experience accompanied by learner feedback. Here I suggest interpreting the shift as gained confidence through the 'visible' and 'invisible' over time in the teaching placement and the SaT course. The 'visible' includes feedback through observable actions from junior learners and cooperating preceptors to stimulate improvement. The 'invisible' includes intuitive insight or emotional intelligence perceptiveness and can be attributed to prior experiences not necessarily found in textbooks such as 'reading the room' (Arora et al., 2010).

For many new teachers, they do not always trust their intuition with classroom management skills. It is through teaching repetition that 4Ys are able to build experience, and confidence, to sense what is needed to alter the learning for their learners. So, it is a positive sign that 4Ys reflected back upon their teaching practice acknowledging how setting expectations for learning, meeting learners where they are, can equate to gained confidence in 'bedside pedagogical skill' and 'classroom management skill' acquisition.

5.2.4 ‘Managing the Psychosocial Environment.’

A large part of the student-teacher relationship involves managing the psychosocial environment. This meaning unit is a stark contrast to the previously discussed meaning units in that the psychosocial is not prescriptive in design, delivery, nor technical in application in a classroom setting. While it is true that some elements of intuition play a part in the execution of clinical and classroom pedagogical skills, much of this vital teaching skill is reliant upon the new teacher to be emotionally responsive and consider their own teaching and learning perspectives and how they influence the classroom. The same can be applied to patient care.

A very interesting finding in this study was how the hierarchy of medicine—the unspoken rules of systemic power and rank in clinical teaching and learning—was more likely to create pressure in the learning climate between the 4Ys and their junior learners. Hierarchy in medical education represents various levels of experience throughout a career with an attending as the topmost rank and the medical student as the lowest rank. The highest provides authority over the next level up in rank with regards to teaching and learning. The medical education hierarchy is often considered hidden curriculum—lessons learned about the social learning environment but not openly intended. Further, the hierarchy is often considered toxic in how it models poor communication skills and feelings of shame.

Throughout several of the 4Y journal posts, I found the hierarchical system to be an underlying theme for which the 4Y internally grappled with while teaching junior learners. In this study, the 4Y was the highest in rank and the junior learner lowest in rank. Journal statements such as “I tried to normalize [feedback] so [learners] don’t feel bad,” and “not as harsh as [feedback] would be from an attending,” or “I try to be welcoming overall,” and even “down to earth” ascribe elements of the hierarchy within their mindset that they intended to

reduce in practice. How the 4Ys individually choose to use their knowledge gained from the power hierarchy, however, varied depending upon their prior lived experiences. For example, one 4Y suggested that being a medical student "having so recently been in their [the junior learner's] shoes" has helped to "connect [with the learner] in a more meaningful way," thereby establishing a good rapport with the learner and gaining greater confidence in their own practice "based on what I wish educators had done for me." All 4Ys wrote about the importance of establishing grounded trust—connection through previously shared personal experiences—with their junior learners in some way or another.

These data are consistent with the literature describing perceived benefits for medical student learners with residents as teachers who are closer to their circumstances—social congruence (Freret et al., 2017; Dandavino et al., 2007). Findings suggest that 4Ys and junior learners feel the further away one is from their education experience, the less desire they may have to connect with their learners. Therefore, the attending might see the junior learner as someone to be "pimped" of knowledge, a rite of passage in the hierarchy, rather than a team member "recently in their shoes" where knowledge is co-constructed. Pimping is considered a paradigm of successful clinical learning through rapid-fire questioning (McEvoy et al., 2019). Pimping differs from traditional teaching pedagogy in that the questions may or may not have an intended learning goal (or answer), nor does it clarify meaning or engage the learner. Some studies describe the after-effects of pimping as a proven tool for success in select settings (Goebel et al., 2019), while others say it is a "controversial pedagogical technique" in medical education and a form of disempowerment to learners (Chen & Priest, 2019; McCarthy & McEvoy, 2016).

For several of the 4Ys, pimping provided a barrier to teach effectively within their clinical earning environment. As a result, they identified ways to remove the barrier, establish grounded trust with their junior learners, shift the former mindset, and create a safe environment to ask question without punishment or shame. In this study, pimping was not a teaching skill the MSaE course introduced or taught to 4Ys as a 'classroom management pedagogical skill' or a 'bedside teaching pedagogical skill.' However, two of the 4Ys journaled about how they deliberately chose to "pimp" their junior learners, but they supported their intentions with establishing grounded trust first and structuring the rapid-fire questioning around the content to engage learners and establish an anchor point for instruction. One 4Y wrote:

> We gave [learners] an overall picture of how we would both be teaching them and then discussed how the preceptorship will work. ... explained some of the basics and H&Ps on a patient and then discussed patient interactions and offered any constructive comments from my end. I then went through the HPI section in detail and *pimped the two students* [emphasis added] on what should go in an HPI and a common pneumonic [sic] used to remember important questions to ask. I think that helped the students be more engaged rather than have me list the answer briefly then move onward. (4Y, J14, Date 08-21-20)

In the context of teaching and learning, the majority of the 4Ys wrote about the connection of their gained confidence through learner comfort in the learning environment. A lack of established grounded trust between 4Y teacher and junior learner could become a barrier to active learning and engagement. Such a hypothesis holds implications for how well the psychosocial environment aspect can bolster greater self-efficacy and confidence as teachers (Yoon et al., 2017). Therefore, the importance of introducing an awareness to matters on

managing the psychosocial environment in future SaT educator training and research cannot be underestimated.

5.2.5 'Educator Identity Formation.'

Of the four meaning units that emerged from the journal posts and summative reflective narratives, 'educator identity formation' reflected the greatest gain in the 4Y participant experience under the auspices of Transitional Learning Theory. As previously explained in Section II, a transition as defined by Anderson et al., (2012) is, "any event, or nonevent that results in changed relationships, routines, assumptions, and roles" (p. 39). This definition is aligned with the findings of this study. 4Y participants provided journal accounts of teaching "events" (clinic setting, virtual classroom setting) in which they have taken part in where they felt a positive impact of transition as they saw themselves thinking more like a teacher and less like a medical student. Teaching accounts of "nonevents" included the COVID-19 pandemic and the journal descriptions recognizing their new educator identity formation impacted as a result. Many 4Y journal posts described how their ability to "think" like a teacher had bigger implications with how they approached teaching their junior learners with a more focused bullseye approach. In this regard, educator identity formation influenced the 4Ys perceptions of confidence in teaching further reinforcing the existing literature by Anderson et al. (2012) on the impact of self-perception on 4Ys educator identity formation and inner growth.

While meaning units such as 'clinical bedside pedagogical skill' and 'classroom management pedagogical skill' provide valuable insights into the ways in which 4Y participant gain greater teaching skill confidence, it is the inner development and personal professional growth which provide valuable insights about how 4Ys navigated this growth in confidence

within their new roles over time. Transitions from learner mindset to teacher mindset can be challenging for new teachers, and many of the most difficult navigations were readily apparent while in the teaching field. For example, 4Y participants were equipped with the tools on how to teach at bedside in order to prepare for the junior learner, but they had yet to grapple with their own identity as a teacher including the formation of contextual questions from an educator perspective and not a medical student-peer learner perspective. Many 4Y journal entries hinted on the sensory depictions of identity formation by noting how 4Ys saw themselves in the role of teacher and could "sense their confidence growing," felt their teaching style change through "practice experimenting with different methods," and held a deeper appreciation for teaching when hearing their learner's and cooperating preceptor's suggested feedback as areas to improve upon. Prior literature has suggested that teaching communities of practice, including optimizing teaching experiences with likeminded people, can also help optimize educator identity formation and self-awareness while navigating what Wenger-Trayner et al., (2015) describes as the metaphorical educational landscape (see also, Cantillion et al., 2016; Jauregui et al., 2019).

The aforementioned aspects of educator identity formation support the findings of 4Ys improved confidence, examined in this study. These aspects rely heavily on "Social Rapport." Social Rapport is one of four factors in transition theory where 4Ys and cooperating preceptors exchange ideas about teaching and learning through direct feedback on their instruction and practice (Anderson et al., 2012). What makes social rapport unique to this study is how the exchange of ideas about teaching was exclusive to interactions within a group of teachers, such as the MSaE community of practice, over set period of time (Wenger-Trayner et al., 2015). While the original version of the term 'communities of practice' by Lave and Wenger (1991) was not intended to describe how to create better classroom curriculum, it has since evolved into

an instrumental tool for learning in medical education faculty development (Buckley et al., 2019; Cantillon et al., 2016; Jauregui et al., 2019). For example, coordinating preceptors who provided feedback—formative or summative in design— to 4Ys throughout the iterative teaching events maintained social rapport by stimulating feelings of confidence in the 4Ys teaching practice. These social interactions are what help shape the 4Y within the metaphorical educational landscape. Therefore, increasing opportunities to practice with both preceptor coordinator feedback and junior learner feedback is a necessity for improvement.

Many 4Ys noted in their responses that without this social rapport, their transition from student to teacher could not successfully exist regardless of continuous skill practice. The findings in this study suggest that a method combining emotional intelligence with skills development provides medical student teachers with enhanced confidence in teaching and leads to a gradual shift in their beliefs and attitudes about better communicating with learners and patients. Further, the findings in the current study align with the work of Schlossberg (2012) and Wenger-Trayner et al., (2015), which found it important that a formal SaT program serve as a purposeful option to bridge the gap between 4Y and PGY-1.

Student teacher preparation training requires a robust program with opportunity to practice in front of learners, within consistent student teaching placement, on a consistent schedule. Additionally, a successful teaching preparation training program will host a community of practice which includes members who are invested in the teaching and learning field and have vast lived teaching experiences with witch to share resources and knowledge. The four meaning units just discussed provide valuable insights into the ways in which fourth year medical student teachers can benefit from such a program. They also provide a greater understanding into how medical institutions must think about creating SaT programs which help

transition fourth-year medical students for their roles as first-year resident who teaches medical students.

5.3 Limitations

This improvement science study has several limitations. First, the study was conducted during the COVID-19 pandemic. This resulted in the 4Yparticipants having to teach junior learners virtually before interacting in person with patients at bedside. The virtual environment was less conducive to teaching bedside skills, such as the physical exam, such as the physical exam, and this unfamiliar educational paradigm created some tension. This ongoing tension led educators (4Ys and cooperating preceptors) to feel constrained in what they teach and how they teach it. A second limitation includes a small sample size of 4Y participants due to the implementation of the study at a single medical school campus. Participants for the study were based on the local campus where access to the junior learners in their pre-clinical classroom was within walking or a short driving distance for participants. Therefore, institutional factors on other campuses will need to be considered with future adoption of the intervention across campuses as the results of this study may not be generalizable to other medical schools with multiple campuses. A third limitation was that not all teams (4Ys, coordinator preceptors, junior learners) could maintain a consistent learning schedule with planned meetings and educational objectives because of COVID-19 restrictions to patient care. As a result, some of the 4Y participants did not post a teaching journal reflection and, therefore, the journal entries were limited and demonstrated selection bias. It is possible that a complete sample of journal entries from all participants, for each month, would identify more differences between the meaning

units. A fourth limitation was in the lack of a clear benchmark to compare with different medical school SaT programs. This study looked at the success of only SaT course. The MSaE course is rather atypical in comparison with most SaT courses design in that it models elements of a college teacher training program with teaching placements. Highlighting this point is the fact that 4Ys in the MSaE course spend over 50 hours in documented teaching activities compared to traditional SaT programs (Erie et al., 2013; Soriano et al., 2010). Due to the unique design of the MSaE course, the findings in this study which are positive may not necessarily be replicated on other medical school campuses. A final limitation includes the role of the researcher in the study. While I served as the lead researcher in the study, I also simultaneously directed and instructed within the MSaE course. During my role as course director, all 4Ys could contact me for support in their teaching and learning progress, which may have contributed to response bias in some journal posts.

5.4 Next Steps

In this part of Section IV, the next steps are broken down by the results of the study:

1) Instruments,
2) Students-as-teachers (SaT) courses,
3) Postgraduation digital community of practice

An in-depth explanation is provided as to the connection between the instruments in the study, the student-as-teacher (SaT) course design, and the postgraduation digital community of practice as an extension of the SaT course.

5.4.1 Instruments

Both instruments used in this study were intended for the field of education. It was my intent that—although created for a traditional teacher certification classroom context—some insight would emerge from the use of the instruments in the medical student teacher classroom. Further, to ensure validity and remove my own assumptions about learner created posts, the settings were anonymous. Participants were informed they could write journal entries without identifiers yet some noted the name of their preceptor coordinator in the journal—which I assigned in the beginning of the intervention—thereby removing anonymity. However, the findings of the study provided for implications for future research. It is conceivable that revealing participant names on each journal entry could provide a visible path of growth from first journal post to final journal post.

5.4.2 Bi-Weekly Journaling

Bi-weekly journaling served as incremental driver measures in the study. 4Ys responded with the most amount journaling in 'September,'—the initial stage of the data collection— which pushed the 4Ys to reflect upon their practice in a way they had not done in prior academic settings. Similar to the study by O'Keefe and Paige (2020) with pre-service teachers, several initial journal posts addressed technical aspects or course requirements, while other initial posts reflected personal enjoyment in teaching. While journaling is a common reflective practice for the traditional pre-service teacher, it is not an act that most medical students do frequently. The bi-weekly journal instrument, although successful in capturing real-time reflections from 4Y

teachers and creating a robust set of qualitative data, fell short in providing individual participant growth and development due to the participant anonymity setting.

5.4.3 Summative Reflection Narrative

In using a modified version of Yoon, et al.'s (2012) survey instrument, I found there may be areas requiring adjustment for use with the 4Ys. The original instrument reported in Yoon's study was shown to be notable through a phenomenography approach; however, overall the data in Yoon's study was gathered as a grade at the end of the academic years. In this study, the modified instrument asked learners for a summative narrative on their progress to date, halfway through the MSaE course. A productive extension of this research might be the redesign of the summative narrative to hold a retrospective look over the entire duration of the academic year that is encompassing of all learned teaching skill development. Similar to the bi-weekly journal instrument, I maintained anonymity in submission.

In future use, I will remove the anonymity setting from both instruments. It is my recommendation that other institutions interested in similar SaT research consider coding the entries in order to see individual 4Y growth, journal post to journal post. Furthermore, the process of feedback with formative (journals) and summative (final reflection) assessment methods complement each other and can be easily reproduced in other SaT courses.

5.4.4 Students-as-Teachers Courses

The study contributed additional evidence regarding the added value of the formal SaT course on 4Y preparedness for their role as PGY-1 through the results of the qualitative

reflections completed by 4Ys, which also included their written and verbal feedback from coordinator preceptors and junior learners as a requirement of the MSaE rotation. Additional information gathered informally through discussions between junior learners and coordinator preceptors had positive reactions toward the 4Ys in the teaching field experience; they agreed that the addition of the 4Ys teaching specific bedside skills were relevant to their learning and that the 4Ys consistent presence in and out of the teaching environment was valuable for providing and receiving constant feedback on performance. Cooperating preceptors also agreed that it was an easy transition having a 4Y student teacher to co-teach with, in and out of the clinical environment, and wish to continue the practice in the next academic year. Junior learners shared a universal agreement that the 4Ys' teaching accurately reflected that of a confident educator who cared deeply about their academic success. This information, collected informally throughout the MSaE course, is pertinent as it further supports the benefit of iterative practice with a formal SaT course and the far-reaching impact within the school of medicine curriculum.

As a community of educators in academic medicine, we—and our learners—value high quality teaching and innovation yet struggle to find (or make) time to refine the skills required for successful teaching reflecting these values. The research by Yoon et al. (2012) and Blatt and Greenberg (2006) reported that fourth-year medical student teachers felt an overall improvement in their demonstration of communication skills through the value of a formal SaT course. The participants in this study similarly described their improvement and overall motivation to enroll in the course. Responses included:

- "I hope to gain some confidence throughout this course and feel comfortable enough to be able to teach once I start residency,"

- “I want to be a great teacher as a resident and attending because I want to continue to improve the care we provide for patients,”
- “While I have had experience teaching, I have never had formal training from an expert on how to do it properly,” and
- “I have a passion for academic medicine and hope to use this rotation to help enhance my skills and understanding of ways to connect to students in the classroom and in a practical setting (the wards, operating room, etc.).”

While medical education institutions work diligently to improve faculty development on a frequent basis, we rarely consider medical student teacher development—that is, teaching medical students how to teach and think about teaching as a professional practice. The need to also include medical student teacher development is pertinent when considering the issue of why it is overlooked as not all graduate residency programs will provide proper training for all PGY-1s within their career. Such programs often have widely differing PGY-1 curriculum and lack iterative opportunities to apply clinical and classroom skills to medical teaching. That is why doing so within my place of practice, specifically within the MSaE course, would align with efforts to promote the transition of student to teacher before residency.

5.4.5 Postgraduation Digital Community of Practice

Another idea to emerge from the study is the inclusion of a transitional PGY-1 digital community of practice (CoP). When I stepped into my first public school classroom, after graduation from a teacher college, I found myself without support and resources in my place of practice. While there were several different types of professional developments and teaching networks available to me, they did not always offer sustainability within the context of educational

practice or sense of belonging with new teacher identity formation. A recently published article from Jauregui et al., (2019) describes a framework for a longitudinal faculty development fellowship program CoP which supports the long-term maintenance of educator identity for those going into academic medicine practice. Through the CoP, participants in the study were able to share passion for education with likeminded individuals, find a greater sense of agency in educational change in their place of practice, and lessening the feeling of "drift" from their CoP due to workplace demands (Jauregui et al., 2019, pg. 124). As an expert teacher and curricular designer of a formal SaT course for the past three years, I have maintained communication with several medical student teachers—now residents—who have shared a similar feeling in their new places of practice.

One way we—educators and learners—stay connected is through a professional medical education social media presence. Established medical education teaching programs—such as Harvard Macy Institute and Brigham Education Institute—now offer a virtual CoP for their medical educators (Harvard Macy Institute, 2011; Brigham Education Institute, 2016). Medical educators within the learning community continue to share their teaching successes and creative initiatives, thereby expanding the community as a social support for those invested in teaching and learning in medical education. I believe a similar process—perhaps a "Medical Students as Educators Virtual Community"—could be developed and utilized to allow current 4Ys and PGY-1's (former SaT 4Ys) a place to continually share and expand on their teaching ideas and professional development while trekking the education landscape. While this community looks different from the traditional definition of community of practice by Wenger (1998), it will create an initial place for likeminded 4Ys (now PGY-1s) to share ideas and artifacts on teaching and learning in practice, beyond the SaT course. Further, the MSaE virtual CoP could prevent drift that

Jauregui et al., (2019) discuss in their research while continuously shaping identity through the collaborative practice of talking about teaching and learning initiatives and identifying lagging measures such as improved confidence over time.

5.5 Concluding Remarks

With varying degrees of definitions that exist regarding SaT design and implementation (Marton et al., 2015; Pasquinelli & Greenberg, 2008; Soriano, et al., 2010), the one specific to the realm of formal course design must not be compared to other contexts. It is my belief that this study contributes to the literature on SaT programs and can help continue the dialogue as to what are the actual benefits associated with the formal teaching program (including a clinical teaching field experience) and its implication on the transition of medical students to PGY-1. Overall, the SaT program in this study achieved a positive improvement with gained confidence in teacher skills acquisition. It is my hope that this study will encourage medical schools to seek ways to further develop formal SaT courses and, in turn, propel future studies to provide discovery as to the ways in which their medical student teachers physically change the educational landscape withing their place of practice.

Appendix A PDSA Cycle

PDSA Form

Test Title:	Phenomenography of Student Experiences	**Date:**	Sep-20
Tester:	Anna Lama	**Cycle #:**	1
What Change Idea is being tested?	Create a Bedside Teaching (BT) Module + field experience where students observe and practice bedside teaching skills, with junioir medical students and patients, to increase confidence in teaching skill acquisition.	**Driver:**	Environment Driver - Increase connection between academic and clinic field teaching.
What is the overall goal/hypothesis you are testing?	To ascertain whether the addition of a Bedside Teaching (BT) Module + field experience increases the levels of fourth-year (4Y) medical student confidence in teaching and assessment skill acquisition from the current state to very confident.		

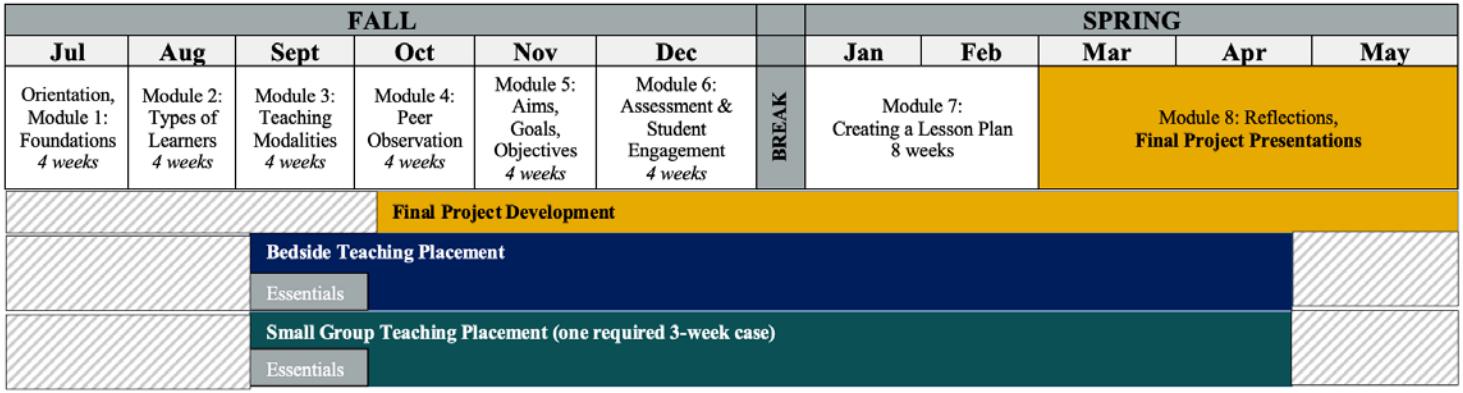
1) PLAN: Describe the who/what/where/when for the test. Include your data collection plan.			**2) DO Briefly describe what happened during the test,**
Qualitative data will be used for the **PLAN** portion from September 2020 - December 2020. (1) A letter of consent will be emailed to the participants: twenty-three (23) students currently enrolled in the Medical Students as Educator couirse. On September 1, 2020, all participants will begin a 12-week student teaching experience within select established courseIn order to track progress during the PDSA cycle. Bi-weekly jjournaling will provide feedback or check points throughout the PDSA cycle intervention in order to provide real-time adjustments through action research Data will be anonymous and captured in WVU's password protected learner management system. de-identified in secure work database (H Drive). (2) At the conclusino of the student teaching placement by December 1, 2020, participants will complete a summative persona narrative reflection through Pitt Qualtrics account.			(1.) Gathered data from bi-weekly journal entries and post-reflective summary narrative developed in Qualtrics; (2) Participation letter sent to 12 4Ys enrolled in the course; (3) 12 participants completed the requirements to participate; (4) Learned how to apply phenomenography as a lense to analyze data; (5) Write dissertation chapters; (6) Present findings to gropu of stakeholders; (7) Developed a doctral defense presentation, sent invitation,a dpresented defense.
Key Questions: Questions you have about what will happen. What do you want to learn?	**Predictions:**	**Data:** Data you'll collect to test predictions.	**What were your results?** Comment on your predictions in the box below. Were they correct? Record any data summaries as well.
What do 4Y MSaE student teachers report on perceptions around confidence in teaching procedures while in their student teaching experience?	All 4Y MSaE student teachers will report notable changes from current level of confidence to very confidence by the end of the six month teaching experience.	**Bi-Monthly Electronic Journaling** during the six-month student teaching experience describing their thought processes during interactions with learners.	All 4Ys noted improvement in their overall confidence of teaching skill, although some had initial confidence in teaching due to previous teaching experiences such as tutoring or workshops.
In what ways do students self-assess increased confidence in teaching skill acquisition and reflect on their student teaching performance?	All 4Y MSaE student teachers will increase in confidence from current standing to confident or extremely confident.	**Personal Narrative Reflection** at conclusion of six-month student teaching experience describing approaches implemented.	The 4Ys relied upon different resources, such as feedback from junior learners and cooperating preceptors, to establish their overall increased confidence in teaching skill development through the intervention.

4) ACT Describe modifications and/or decisions for the next cycle; what will you do	**3) STUDY What did you learn?**
(1). Will adjust the bi-weekly journals to reveal the 4Ys names in order to follow their progression; (2) will establish teaching opportunities on each of the three campuses. (3) will work to develop a professionrl Virtual MSaE Twitter Communities of Practice to maintain connection and reduce post-course drift, (4) will puglish findings in journal to contribute to the underdeveloped literature on SaT programs.	(1) A longitudinal SaT course can provide the space for 4Ys to practice teaching and learning; (2)Offering structured, iterative teaching opportunities within the SaT course will allow 4Ys to practice teaching and application of new teaching skills, thereby refining their practice and increaseing confidence in teaching skill acquisition; (3) Bi-Weekly journa entries and post-self reflection narratives are purposefull in engaging the 4Y in deep self-reflection on the ways in which they are imporving in their teaching skills; (4) A successfull SaT course requires the input of multiple stakeholders invested in the growth and development of 4Ys as the faculty-of-the-future.

Appendix B Gantt Chart

July 2020 – August 2020	• Receive feedback and make changes • Draft and submit penultimate proposal overview for PI4 • Create instruments in Pitt Qualtrics©
September 2020	• Present Dissertation Proposal to the Committee • Receive feedback and make changes • Obtain University of Pittsburgh IRB and Dissertation Committee approvals prior to commencement of the study • Obtain West Virginia University IRB approval (After receiving University of Pittsburgh IRB approval) • Send letter of consent to MSaE students
September 2020 – November 2020 *PDSA Cycle*	• Upon IRB approval, send e-mail to MSaE 4Y participants • Initiate bi-weekly journal requirements
December 2020 – January 2021 *Data Analysis*	• Export bi-weekly journal data • Review survey instrument scores • Complete focus group surveys • Run suggested data analysis according to advisor • Analyze data
February 2021 *Section 4*	• Write Sections 4 & 5 • Present to ISDiP Committee • Obtain feedback from the ISDiP Committee • Make necessary changes
March 2021 *Complete Manuscript*	• Submit complete manuscript to the ISDiP Committee • Obtain feedback • Make necessary changes
April 2021 *Final Dissertation Defense*	• Final defense of the dissertation
May 2021 Binding and submission to Pitt	• Prepare final manuscript for submission

Appendix C Medical Students as Educators (MSaE) Curriculum



Essentials of the Placement: Orientation to placement, introduction to placement co-teacher within course, review of rules and expectations, explanation of weekly formative feedback, review of rubric.

Small Group Teaching Placement: MSaE students are required to complete one cycle through problem-based learning course. The cycle is every Monday for three weeks.

Final Project: MSaE students will begin working on their final project presentation(s) beginning in October and may present at any time in the spring beginning in February. All projects will require a minimum of three (3) iterations in practice with learners present.

Bedside Teaching Placement: MSaE students will complete multiple teaching placement journals over the duration of the rotation. They may choose from PDCI II or a selection of Sub-I and Elective courses to submit the required teaching journal log entries. .

Appendix D Electronic Bi-Weekly Journal Entry

Electronic Bi-Weekly Journal Entry

The journal is a place for you to collect observations from, and responses to, the daily activities with Bedside Teaching (i.e., taking a history, performing a physical exam). In addition to keeping observation notes (e.g., laptop, iPad, paper journal), which are primarily descriptive, you will also want to think analytically about your experiences in the clinic teaching field. Use the following questions to create your journal post:

- What educational setting is the subject for this journal entry (e.g., clinic, classroom, virtual/zoom, etc.)?
- What skills and knowledge are you learning to apply to your teaching practice?
- What are the challenges and questions that crop up as you apply your knowledge?
- What new ideas do you have about what it takes to become a teacher confident in skill acquisition?
- From what sources (e.g., direct student feedback, students' performance on write-ups, preceptor observations, etc.,) are you getting your feedback and what are you doing to maximize the feedback you receive?
- Have you recognized any limitations in your teaching skill based on feedback? What skills and knowledge do you need to improve upon in your practice to gain confidence?
- While working with your learners, in what ways did the learners in this setting communicate what is important to them?

Date of Journal Post

Required

Journal Post # (e.g., Journal Post #1)

Required

journal Entry

Required

How would you rate your level of confidence teaching this week?

- [ ] Very confident
- [ ] Confident
- [ ] Somewhat confident
- [ ] Not confident

Required

Appendix E Monthly Bedside Teaching Formative Feedback Checklist

Please select your role: ( ) M2 LEARNER, ( ) PRECEPTOR

Instructions: Please check the appropriate box (YES/NO) per question and provide a small comment about the student's performance overall. Your feedback will be presented to the MSaE student anonymously, in aggregate form, and will contribute to his/her overall progress in the course.

TEACHING SKILLS	**YES**	**NO**
MSaE student was on time consistently for each scheduled meeting.		
MSaE student was professional and prepared for the PDCI II learning activity.		
MSaE student demonstrated enthusiasm for teaching and learning		
MSaE student created a "safe space" for learning (made clear to learners that making mistakes is part of the journey to mastery and offers opportunities for enhanced teaching and learning).		
MSaE student guided learning by asking probing questions.		
MSaE student helped identify gaps in the learner's knowledge.		
MSaE student helped integrate individual clinical skills (e.g., history, physical exam, write-ups, problem list, etc.) with patients (standardized and/or real).		
MSaE student provided helpful feedback regarding performance in various settings (e.g., virtual session, bedside with patient, SIM lab, etc.,).		
MSaE Student was involved with teaching PDCI II SIM lab activities *(Note: If the student did not work in the SIM lab during this time, leave this section blank.)*		

COMMENT BOX

Please provide feedback on your work with the MSaE student teacher answering the following questions:

- What did they do well?
- What did they not do well?
- What did you observe about his/her ability to receive feedback and practice between scheduled PDCI preceptor sessions?
- What suggestions do you have for the MSaE student teacher for the next teaching session?

Appendix F Semi-Annual Bedside Teaching Rubric

	4 – High Proficiency *Responsibility increases with experience*	**3 – Competent** *Higher order rules shape contexts; Actively makes choice*	**2 – Novice** *Only capable of following the Rules. No intuition to adjust.*	**1 – Does Not Meet Standards**
Preparation for Learning	Exceptional ability to demonstrate unit of instruction preparation; completed before specific course performance goal timeline	Unit of instruction is developed and at appropriate level; completed within specific course performance goal timeline;	Unit of instruction is developed but not at a level that could be considered basic; did not follow instructions within specific course performance goal timeline;	Does not prepare for learning. Multiple parts of the unit of instruction are missing or incomplete; Did not follow instructions;
Professionalism	Presents as professional, carries out assignments, is punctual and reliable.	Demonstrates professional demeanor; is always punctual.	Occasionally acts and/or dresses in an unprofessional manner. Is almost always late. Misses some deadlines.	Frequently acts and/or dresses in an unprofessional manner; Is late with several absences.
Presentation	Information is very well organized; Lesson has a clear beginning and end; Teaching materials (if applicable) are high-quality with zero errors;	Information is organized in solid and appropriate format; Lesson has a loosely structured beginning and end; Teaching materials (if applicable) are good with minimal errors.	Information is basically organized; Lesson lacks essential pieces; Teaching materials (if applicable) are mediocre and minimally engaging.	Information is disorganized and incomplete; Lesson is not evident; Teaching materials (if applicable) are low-quality.
Engagement	Engages all learners in focused activities, actively learning and problem-solving	Has learners actively think about, discuss, and use skills being taught	Attempts to get learners actively involved but some students are disengaged	Mostly teaches to passive learners or pushes them through the session to finish
Instructional Strategies	Uses a wide range of well-chosen, effective strategies, questions, materials, to accelerate learner understanding	Orchestrates effective strategies, questions, and materials used to promote active learning and foster learning.	Uses a limited range of classroom strategies, questions, materials, and groupings with mixed success.	Uses only one or two teaching strategies and materials, fails to reach learners
Feedback	Feedback is consistent, constructive and encouraging; questions provide opportunity for formative assessment and enhance delivery;	Feedback to learner is appropriate to learner level; will likely provide accurate mastery.	Feedback to learner is incomplete with applying mastery and understanding of most of the material presented; More critical thought is needed.	Feedback to learner is brief and/or almost never provided.

Appendix G Personal Summary Narrative Reflection Instrument

Summary Narrative Reflection Instructions

1. Reflect deliberately on your efforts in the MSaE course this semester. After this self-assessment, assign yourself a final confidence level as a student teacher applying clinical teaching pedagogy as one of the following: Very Confident, Confident, Somewhat Confident, or Not Confident.

2. Write a narrative (minimum of 2-paragraphs) justifying the level and how your gained teaching experiences have contributed to your level of confidence as an educator. Use specific examples (e.g., feedback from your junior learners, feedback from your supervisors, direct quotes about how effectively you taught, your own wonderings about your identity as a teacher), that you believe justify the final confidence level you assigned yourself. A portion of the course evaluation will be based on the quality of the narrative you write.

How would you rate your level of confidence as a student teacher applying clinical teaching pedagogy?

Very Confident

Confident

Somewhat Confident

Not Confident

Appendix H Informed Consent Email.

Letter of Consent

Dear WVU Medical Student:

Your participation in a research project is requested. The title of the study is "Medical Students' Improved Confidence as Educators Revealed Through Reflections On Their Teaching in a Student-As-Teacher Course: A Qualitative Study". The research is being conducted by Anna Lama, a doctoral candidate in the School of Education at The University of Pittsburgh, and it is seeking information that will be useful in the field of teaching medical students. The aim of the research is to understand how a student-as-teacher course will better support the transition of fourth-year medical students to first year resident educator. In accordance with this aim, the following procedure will be used: A summative Narrative Reflection about your student teaching placement which follows this letter in December 2020.

If you decide to participate in the research, you will be asked to do the following: Answer the question on the Summative Narrative Reflection. The question is estimated to take no more than 25 minutes to complete. Your class standing will not be affected if you decide to not participate or to withdraw.

Your consent to be a research participant is strictly voluntary and should you decline to participate or should you choose to drop out at any time during the study, there will be no adverse effects.

There are no risks of involvement in this study. There are no direct benefits to you for participating in this study; however, your participation will contribute to research in the areas of medical student teacher program development.

As a research participant, information you provide is anonymous, that is, no names or other identifiers will be collected. Qualtrics allows researchers to suppress the delivery of IP addresses during the downloading of data, and in this study no IP addresses for its own purposes. If you have concerns about this, you should review the privacy policy of Qualtrics before you begin.

By clicking “I agree” below, you are acknowledging that you are at least 18-years-old, currently enrolled as a medical student at the West Virginia University School of Medicine, and enrolled in the Medical Students as Educators course.

If you have any questions or concerns regarding thee study or your participation in the study, you may contact me, Anna Lama, by phone at 204-293-7323 or by email at alama@hsc.wvu.edu or you may contact Dr. Scott Cottrell (scottrell@hsc.wvu.edu). You may also contact the Institutional Review Board point of contact, askirb@pitt.edu 412-383-1480.

Anna Lama, MA
Doctoral Student, University of Pittsburgh, EdD Cohort 2018
Director of Assessment
WVU School of Medicine
alama@hsc.wvu.edu

- ○ I agree to participate in this research study
- ○ No, I do not agree to participate in this research study

Appendix I University of Pittsburgh IRB Approval Letter

University of Pittsburgh | Institutional Review Board
Office of Research Protections

EXEMPT DETERMINATION

Date:	September 11, 2020
IRB:	STUDY20080031
PI:	Anna Lama
Title:	Medical Students' Improved Confidence As Educators Revealed Through Reflections on Their Teaching in A Student-As-Teacher Course: A Qualitative Study
Funding:	None

The Institutional Review Board reviewed and determined the above referenced study meets the regulatory requirements for exempt research under 45 CFR 46.104.

Determination Documentation

Determination Date:	9/11/2020
Exempt Category:	(1) Educational settings

Determinations:	
Approved Documents:	• Bi-Weekly Journal Guide, Category: Data Collection; • Informed Consent_Qualtrics, Category: Data Collection; • Summative Reflective Narrative Prompt, Category: Data Collection; • Educational Site Form, Category: IRB Protocol; • WVU Research Site Form, Category: External Site Permission Letter;

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, Amy Fuhrman.

Please take a moment to complete our Satisfaction Survey as we appreciate your feedback.

Appendix J Additional Bi-Weekly Journal Data for September

Table 8: Additional Description and Examples of Meaning Units for Interention Inquiry Question I Over September

Emergent Theme	Description of Theme (D) and Examples (E) of Statement(s) from 4Y September Journals
1. Classroom Management Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence in planning, agenda setting and pacing. E1: "Time management is difficult. It is hard to limit time with M2's because I think there is a lot that can be learned. It's hard to be ok with not covering everything in one session (sic) Truly listening and meeting students where they are at." E2: "... we talked about our expectations and the schedule moving forward. ... I think being up front about expectations is very important especially in a learning setting that is clinical. Moving forward with my teaching in the future I will definitely make a point to detail my expectations to my learners at the beginning." E3: "I am excited to take on a larger role ... where I will be going over the past medical history and social history with the students. I plan to use similar strategies ... such as assessing their baseline knowledge, and then filling in the gaps."
2. Clinical "Bedside" Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence initially teaching clinical procedural skills. E1: "It's interesting to learn about the different types of learners and their level of preparedness ... My current student is more prepared and put together than my previous student - which should make teaching easier, and yet actually makes teaching her harder to do. ... to find her weak points and the parts of the H&P that she needs to work on." E2: "We discuss the learning objectives for the day and ... the required materials for the course. Then we go into patient rooms so the students can practice their interviewing skills. Afterwards we sit ...and discuss what they did well and what they can improve on. I am learning skills involved with giving focused advice that allows a student to make tangible changes to their approach [at bedside]." E3: "I think prepping the patient also helped calm all involved by saying with everyone in the room that these students are incredibly nice and are just learning the H&P, and so they won't know everything yet but will do their best ...They really appreciated that and it helped provide an overall calm environment. Each student got their own patient, which I think also was great because tag-teaming while learning is not conducive for most students. After each encounter, we debriefed and discussed various things."
3. Managing the Psychosocial Learning Environment	D: 4Y teachers' beliefs about interpersonal communication and establishing a safe learning environment. E1: "I need to take a more structured approach to giving feedback to my students. ... I tend to be long-winded and want to give as much information as I can to help my students, but I need to remember to give them this information in digestible chunks so they can work on a few things at a time."

	E2: “I like to question them [students] during teaching such as "how would you ask a patient about x" Which is a low risk environment for them to formulate a response before it's in front of a patient.” E3: “Even if I was addressing an area of improvement, I also tried to really normalize it. I would state that "I also used to have difficulty transitioning through different parts of the history, and sometimes it made me nervous because I wanted to make sure I was remembering all of the important questions. Making this type of comment seemed to help my students feel more comfortable in knowing that this was simply a skill that everyone works towards, and we will work towards it together.”

Appendix K Additional Bi-Weekly Journal Data for October

Table 9: Additional Description and Examples of Meaning Units for Intervention Inquiry Question 1 over October.

Emergent Theme	Description of Theme (D) and Examples (E) of Statements from 4Y October Journals
1. Classroom Management Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence refining classroom management skills. E1: "This week I wanted to work on letting the students try to figure out an answer or come up with their next statement on their own without me jumping in to help them. I have the natural tendency to jump in and speak before they have had adequate time to answer. I am trying to correct this through using some guiding statements instead of jumping in with an answer." E2: "I think a major component of being an effective teacher is quickly ascertaining the skill level of your students. This allows you to advance the students education." E3: "Today we had a virtual zoom encounter to finish going over how to take a history. This was a new medium for teaching for me, so I wasn't sure what to expect. I think the "assess how the student wants to learn" approach first works really well, especially in this setting."
2. Clinical "Bedside" Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence continuously teaching clinical procedural skills. E1: "For these topics, I still try to use questions while teaching (similar to the 1-minute preceptor). I will ask the students what they know about the ROS to gauge their understanding. I try to build off of the answers they give to make it more conversational." E2: "I am applying practical skills in coming up with a Differential Diagnosis. There weren't many challenges in this session (other than the usual communication difficulties over Zoom). We were discussing the differential diagnosis, which is a classically cerebral exercise and lends itself well to virtual discussion." E3: "I took my two PDCI students to see a patient in the hospital. They conducted an H&P with me present. I was able to see their process and remind them of important components .... It's important to have these in-person learning experiences ... you can make adjustments as you go and learn by doing. I was able to provide feedback right away and help them recognize small changes that could aid in their H&P skill growth."
3. Managing the Psychosocial Learning Environment	D: 4Y teachers' beliefs demonstrating confidence expressed through established trust and support. E1: "I feel comfortable giving the students constructive feedback because I feel as though we have established a nice relationship where they understand that I am trying to be helpful." E2: "I think it is helpful to be in a position where I have no impact on the students' grades as they know they can trust me and that I have no other interest other than helping them learn." E3: "I have met with my mentees again this week. We are continuing to progress with their history taking skills. The awkward moments that were happening frequently before when the students were interacting with patients are now much more infrequent. They are beginning to synthesize information so that there is better flow to their presentations."
4. Educator Identity Formation	D: 4Y teachers' beliefs surrounding a newly formed sense of teaching style.

	E1: “I have tried to be more vocal and upfront with my teaching style as this was what the students had wrote was a way I could improve.” E2: “I feel confident teaching to the students, but sometimes get nervous wondering if the attending [preceptor coordinator] agrees with the information that I am providing. I think this is because it's new for me and something she has done many times over. However, in my performance review she seemed to think I was doing a good job, and I am sure that if she didn't agree with me she would let me know.” E3: “I felt confident going through the rest of the social history, and I appreciated Dr. Catherman's guidance and collaboration with this. I always made sure to ask if she had any other thoughts, and she normally had a few excellent points from her experiences. It makes me wonder if there's added utility in having two professors teach medical student courses. I guess it would depend on the dynamic between the two professors, but I feel like there is something to be said about having multiple view points on a topic.”

Appendix L Additional Bi-Weekly Journal Data for November

Table 10: Additional Description and Examples of Meaning Units for Intervention Inquiry Question 1 over November.

Emergent Theme	Description of Theme (D) and Examples (E) of Statements from 4Y November Journals
1. Classroom Management Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence continuously refining classroom management skills. E1: "November has definitely been a busy month for both my learners and I, but I feel that I have really developed my organizational and time management skills to help us all make the most of the time that we do have." E2 "We reviewed previous material and went over new portions of the physical exam. ... They were able to practice skills they had previously learned and expand upon them with new material. As the patient, I knew where I wanted to go with my teaching points and had mapped out specific learning issues I wanted to cover." E3: "We discussed problem list, general exam, and head and neck exam. I felt it went well. I skimmed the surface of the exam too quickly and Dr. Dione went back to some topics and discussed them further. I then corrected myself and discussed the exam further in as much detail as possible. I appreciated that they were taking notes while I talked which made me feel I was contributing to their education."
2. Clinical "Bedside" Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence continuously teaching clinical procedural skills. E1: "Today we met in STEPS to teach the M2s the heart and lung physical exam as well as review ultrasound. This went very well as our students are very comfortable with us now and are able to ask questions when they don't understand. We were able to assess their weaknesses and help them learn the exam the way that they wanted to learn it, and it felt like an effective session. Now the challenge will be ensuring they retain their new knowledge, which will come with practice and observation." E2: "Bedside teaching was provided via preceptor facilitation groups this month as I was not working with student learners. We discussed how to create a differential diagnosis and a problem list. This was a particular challenge because a good differential requires knowledge of various pathology that the learners may have not been introduced to yet. I found it a challenge to cover everything necessary, but what I did that may be effective is encourage the learners to seek out important information and use discretion during interviews-- I think this is a skill that will help them save time during interviews." E3: "Preparation. Though not significant enough to appear in feedback, I would like my own feeling of comfortability with the material to be better prior to the meetings, which just means doing more preparation."
Emergent Theme	Description of Theme (D) and Examples (E) of Statements from 4Y November Journals
3. Managing the Psychosocial Learning Environment	D: The 4Y teachers' confidence expressed through removing anxiety and judgment. E1: "The skill I've been working on is how to make a comforting learning environment free of judgement, because if the learner is anxious about not getting everything "perfect" they may not be able to truly be present in the lesson. I feel like this sort of rapport building will be helpful to keep in mind with future learners and patients." E2: "It was nice to reflect on my experiences with PDCI and use that to advise them [learners]. This was also their first time doing a virtual encounter so I enjoyed being able to potentially relieve some anxiety about the situation."

		E3: “Today we met in STEPS to teach the M2s the heart and lung physical exam as well as review ultrasound. This went very well as our students are very comfortable with us now and are able to ask questions when they don't understand. We were able to assess their weaknesses and help them learn the exam the way that they wanted to learn it, and it felt like an effective session. Now the challenge will be ensuring they retain their new knowledge, which will come with practice and observation.”
4.	Educator Identity Formation	D: 4Y teachers’ confidence expressed through educator identity formation. E1: “I realized that I really enjoy both teaching and mentoring. They seem to require different skill sets, and I feel that I am slowly progressing in both domains. As I discuss my teaching experiences more and more, my vision for how I want to incorporate teaching into my future career becomes even more clear.” E2: “I appreciated the opportunity to work with my students separately from my fabulous preceptor, as it gave us an alternative interaction. ... Based on the feedback I have received, it seems that making time for students is really one of, if not the most important things to them. And it's so simple.” E3: “One thing that is beneficial about having the PDCI class relatively recently is being able to relate to the students and give them some personal tips and tricks that I still remember. I sort of think of this as "learner empathy" (understanding where the difficulties in their material may lie and trying to understand when they mess up), and I imagine that this is easier when you are closer to the learners in terms of time passed since you had to learn the material. A goal of mine is to maintain this "learner empathy" over time even as I become more distanced from the material.”

Appendix M Additional Post-Narrative Reflection Data for December

Table 11: Additional Description and Examples of Meaning Units for Intervention Inquiry Question 1 over December.

Meaning Unit	Description of Meaning Unit (D) and Examples (E) of Statement(s) from 4Y December Journals
1. Classroom Management Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence in planning and pacing. E1: "Well-structured feedback gave me very specific areas to improve upon as an educator, and I feel that having our students learn this skill will definitely help our entire system in the future. When we educate patients, we are often giving them feedback as well, and learning how to give very specific and direct feedback would be a great skill for any physician to know regardless of career path." E2: "Reviewing the course materials and educational resources taught me the value of creating a lesson plan, which made the teaching sessions far more effective and efficient. ... the experiences change the way I approach teaching students, co-team members, and patient education."
2. Clinical "Bedside" Pedagogical Skills	D: 4Y teachers' beliefs surrounding confidence continuously teaching clinical procedural skills. E1:"Reflecting back on my own experience ... I remembered that asking pertinent positives and negatives for the history could be difficult at that stage of training. I brought this up to my learners after noticing it in their encounters with patients and they agreed that it was difficult to know what more they should be asking. I then used the one minute preceptor technique ... based on the history, what they thought the possible diagnosis would be, and what are some symptoms of that disease process. They then would come up with answers and I would add in some additional thoughts. This ... helped them think through and synthesize what would have been good additional questions to ask the patient."
3. Managing the Psychosocial Learning Environment	D: The 4Y teachers' confidence expressed through creating an open learning environment. E1: "In the future, I realize that I will always have clinical responsibilities, but I hope to still create an open environment for my learners so that they can see teaching as a fully incorporated part of my work day and not a separate component." E2: "They [junior learners] report in their feedback that I give helpful tips for clinical rotations, helpful feedback for improvement on their write-ups, words of encouragement, and create a comfortable environment for them to ask questions. These comments truly make me feel as though I am being helpful and that my learners are gaining something from my teaching, which in turn helps give me confidence that I am being a successful educator."
4. Educator Identity Formation	D: 4Y teachers' confidence expressed through educator identity formation. E1" I was not sure how I would transition from student to teacher but having a good attending to mentor me was important to help me along the way. My feedback was always positive and I always felt confident teaching which is why I picked the 'confident' section above. I hesitate to put 'very confident' because there is always room for improvement but I do feel confident enough to teach any beginning learner in the clinical setting."

	E2: “I just need to continue to actively seek feedback. I feel like that is the true mark of an effective teacher - not only one who educates, but one who constantly looks for ways to improve themselves to better their teaching for their students.”

Bibliography

Al Achkar, M., Hanauer, M., Morrison, E., Davies, M. K., & Oh, R. (2017). Changing trends in residents-as-teachers across graduate medical education. *Advances in Medical Education and Practice*, *Volume 8*, 299–306. https://doi.org/10.2147/amep.s127007

Amorosa, J. M., Mellman, L. A., & Graham, M. J. (2011). Medical students as teachers: How preclinical teaching opportunities can create an early awareness of the role of physician as teacher. *Medical Teacher*, *33*(2), 137–144. https://doi.org/10.3109/0142159x.2010.531154

Anderson, M., Goodman, J., & Schlossberg, N. (2012). *Counseling adults in transition linking Schlossberg's theory with practice in a diverse world.* (4th ed / Mary L. Anderson, Jane goodman, Nancy Schlossberg.). Springer Publishing Company.

Arora, S., Ashrafian, H., Davis, R., Athanasiou, T., Darzi, A., & Sevdalis, N. (2010). Emotional intelligence in medicine: a systematic review through the context of the ACGME competencies. *Medical Education*, *44*(8), 749–764. https://doi.org/10.1111/j.1365-2923.2010.03709.x

Association of American Medical Colleges. (2018). *Medical School Year Two Questionnaire (Y2Q);* [Data file]. Individual School Report. Accessed: March 2019.

Association of American Medical College. (2017). Core entrustable professional activities for entering residency. Retrieved from: https://www.aamc.org/system/files/c/2/484778-epa13toolkit.pdf

Association of American medical College. (2020). Goals of the Core EPAs Pilot. Retrieved https://www.aamc.org/what-we-do/mission-areas/medical-education/cbme/core-epas/goals

Bandeali, S., Chiang, A., & Ramnanan, C. J. (2016). MedTalks: developing teaching abilities and experience in undergraduate medical students. *Medical Education Online*, *22*(1), 1–5. https://doi.org/10.1080/10872981.2016.1264149

Barron, B., Orlander, P., & Schwartz, M.L. (2017). Core Entrustable Professional Activities for Entering Residency—EPA 1 Schematic: Gather a History and Perform a Physical Examination. Obeso V, Brown D, Phillipi C, eds. Washington, DC: *Association of American Medical Colleges.* Retrieved: aamc.org/initiatives/coreepas/publicationsandpresentations.

Bell, A. E., Meyer, H. S., & Maggio, L. A. (2019). Getting Better Together: A Website Review of Peer Coaching Initiatives for Medical Educators. *Teaching and Learning in Medicine*, *32*(1), 53–60. https://doi.org/10.1080/10401334.2019.1614448

Benson, N. M., Stickle, T. R., & Raszka, W. V., Jr (2015). Going "fourth" from medical school: Fourth-year medical students' perspectives on the fourth year of medical school. *Academic medicine: Journal of the Association of American Medical Colleges*, *90*(10), 1386–1393. https://doi.org/10.1097/ACM.0000000000000802

Bergman, E., de Feijter, J., Frambach, J., Godefrooij, M., Slootweg, I., Stalmeijer, R., & van der Zwet, J. (2012). AM last page: A guide to research paradigms relevant to medical education. *Academic medicine: Journal of the Association of American Medical Colleges*, *87*(4), 545. https://doi.org/10.1097/ACM.0b013e31824fbc8a

Bing-You, R. G., & Sproul, M. S. (1992). Medical students' perceptions of themselves and residents as teachers. *Medical Teacher*, *14*(2-3), 133–138. https://doi.org/10.3109/01421599209079479

Blanco, M. A., Maderer, A., Oriel, A., & Epstein, S. K. (2014). How we launched a developmental student-as-teacher (SAT) program for all medical students. *Medical Teacher*, *36*(5), 385–389. https://doi.org/10.3109/0142159X.2014.886770

Blatt, B., & Greenberg, L. (2007). A multi-level assessment of a program to teach medical students how to teach. *Advances in Health Sciences Education*, *12*(1), 7-18. DOI:10.1007/s10459-005-3053-2

Brigham Education Institute. [@BrighamBEI]. (n.d.) *Tweets* [Twitter profile]. Retrieved March 28, 2021 from https://twitter.com/BrighamBEI

Bryk, A.S., Gomez, L. M., Grunow, A., & La Mahieu, P.G.(2016). *Learning to Improve. How America's Schools Can Get Better at Getting Better*. Cambridge: Harvard Education Press.

Buckley, H., Steinert, Y., Regehr, G., & Nimmon, L. (2019). When I say … community of practice. *Medical Education*, 53(8), 763–765. https://doi-org.wvu.idm.oclc.org/10.1111/medu.13823

Cantillon, P., D'Eath, M., De Grave, W., & Dornan, T. (2016). How do clinicians become teachers? A communities of practice perspective. Advances in Health Sciences Education: Theory and Practice, 21(5), 991–1008. https://doi.org/10.1007/s10459-016-9674-9

Chen, H. C., Wamsley, M. A., Azzam, A., Julian, K., Irby, D. M., & O'Sullivan, P. S. (2017). The Health Professions Education Pathway: Preparing Students, Residents, and Fellows to Become Future Educators. Teaching and Learning in Medicine, 29(2), 216–227. https://doi.org/10.1080/10401334.2016.1230500

Chen, D. R., & Priest, K. C. (2019). Pimping: a tradition of gendered disempowerment. BMC Medical Education, 19(1), 345. https://doi-org.wvu.idm.oclc.org/10.1186/s12909-019-1761-1

Dandavino, M., Snell, L., & Wiseman, J. (2007). Why medical students should learn how to teach. Medical Teacher, *29*(6), 558–565. https://doi.org/10.1080/01421590701477449

Erie, A.J., Starkman, S. J., Pawlina, W., & Lachman, N. (2013). Developing medical students as teachers: An anatomy-based student-as-teacher program with emphasis on core teaching competencies. *Anatomical Sciences Education*, *6*(6), 385–392. https://doi.org/10.1002/ase.1364

Erlich, D. R., & Shaughnessy, A. F. (2014). Student-teacher education programme (STEP) by step: transforming medical students into competent, confident teachers. *Medical teacher*, *36*(4), 322–332. https://doi-org.www.libproxy.wvu.edu/10.3109/0142159X.2014.887835

Fenton-O'Creevy, M., Brigham, L., Johnes, S., & Smith, A. (2015). Students at the academic-workplace boundary: Tourists and sojourners in practice-based education. Wenger-Trayner, E., Fenton-O'Creevy, M., Hutchinson, S., Kubiak, C., & Wenger-Trayner (Eds.), *Learning in Landscapes of Practice: Boundaries, identity, and knowledgeability in practice-based learning* (1st ed.)(p. 46). Routledge Press. https://doi.org/10.4324/9781315777122

Finn, K., Chiappa, V., Puig, A., & Hunt, D. P. (2011). How to become a better clinical teacher: a collaborative peer observation process. *Medical Teacher*, *33*(2), 151–155. https://doi.org/10.3109/0142159X.2010.541534

Freret, T., Rana, J., Schwartzstein, R. M., & Gooding, H. C. (2017). Twelve tips for implementation of "student-as-teacher" programs. *Medical Teacher*, *39*(12), 1221–1226. https://doi.org/10.1080/0142159X.2017.1333591

Gifford, K. A., & Fall, L. H. (2014). Doctor coach: A deliberate practice approach to teaching and learning clinical skills. *Academic Medicine: Journal of the Association of American Medical Colleges*, *89*(2), 272–276. https://doi.org/10.1097/ACM.0000000000000097

Goebel, E. A., Cristancho, S. M., & Driman, D. K. (2019). Pimping in residency: The emotional roller-coaster of a pedagogical method - A qualitative study using interviews and rich picture drawings. *Teaching and Learning in Medicine*, *31*(5), 497–505. https://doi.org/10.1080/10401334.2019.1610658

Goldie J. (2012). The formation of professional identity in medical students: considerations for educators. *Medical teacher*, *34*(9), e641–e648. https://doi.org/10.3109/0142159X.2012.687476

Greenberg, J., Pomerance, L., and Walsh, K. (2011). *Student teaching in the United States*. National Council on Teacher Quality. https://www.nctq.org/dmsView/Student_Teaching_United_States_NCTQ_Report

Haber, R.J., Bardach, N.S., Vedanthan, R., Gillum, L., Haber, L.A., & Dhaliwal, G.S. (2006). Preparing fourth-year medical students to teach during internship. *Journal of Internal Medicine, 21,* 518-520. https://doi.org/10.1111/j.1525-1497.2006.00441.x

Harvard Macy Institute. [@HarvardMacy]. (n.d.) *Tweets* [Twitter profile]. Retrieved March 28, 2021 from https://twitter.com/HarvardMacy

Heifetz, R., Grashow, A., & Linsky, M. (2009). *The practice of adaptive leadership: tools and tactics for changing your organization and the world*. Boston, Mass.: Harvard Business Press.

Jauregui, J., O'Sullivan, P., Kalishman, S., Nishimura, H., & Robins, L. (2019). Remooring: A Qualitative Focus Group Exploration of How Educators Maintain Identity in a Sea of Competing Demands. *Academic medicine : journal of the Association of American Medical Colleges*, *94*(1), 122–128. https://doi.org/10.1097/ACM.0000000000002394

Katz-Sidlow, R. J., Baer, T. G., & Gershel, J. C. (2016). Providing rapid feedback to residents on their teaching skills: an educational strategy for contemporary trainees. *International journal of medical education*, *7*, 83–86. https://doi.org/10.5116/ijme.56dc.908a

Kloek, A. T., van Zijl, A. C., & Ten Cate, O. T. (2016). How a teaching rotation in medical school affects graduates' subsequent careers. *Perspectives on Medical Education*, *5*(6), 325–331. https://doi-org.wvu.idm.oclc.org/10.1007/s40037-016-0302-4

Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation* . Cambridge University Press.

Larsson & Homstrom. (2007). Phenomenographic or phenomenological analysis: Does it matter? Examples from a study on anaesthesiologists' work. *International Journal of Qualitative Studies on Health and Well-being*, *1*(2), 55-64. DOI: 10.1080/17482620601068105

Levine, A. (September 2006). Educating school teachers. Washington, DC: The Education Schools Project. Retrieved from http://edschools.org/pdf/Educating_Teachers_Report.pdf

Liaison Committee on Medical Education. (2019). *Functions and Structure of a Medical School: Accreditation and the Liaison Committee on Medical Education, Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree*. Washington, DC: Association of American Medical Colleges and American Medical Association. Retrieved from https://medicine.vtc.vt.edu/content/dam/medicine_vtc_vt_edu/about/accreditation/2018-19_Functions-and-Structure.pdf

Lyss-Lerman, P., Teherani, A., Aagaard, E., Loeser, H., Cooke, M., & Harper, G. M. (2009). What training is needed in the fourth year of medical school? Views of residency program directors. *Academic medicine : journal of the Association of American Medical Colleges*, *84*(7), 823–829. https://doi.org/10.1097/ACM.0b013e3181a82426

Marton, G. E., McCullough, B., & Ramnanan, C. J. (2015). A review of teaching skills development programmes for medical students. *Medical Education*, *49*(2), 149–160. https://doi.org/10.1111/medu.12571

McCarthy, C. P., & McEvoy, J. W. (2016). Pimping as a Practice in Medical Education--Reply. *JAMA*, *315*(20), 2236–2237. https://doi-org.wvu.idm.oclc.org/10.1001/jama.2016.1580

McEvoy, J. W., Shatzer, J. H., Desai, S. V., & Wright, S. M. (2019). Questioning Style and Pimping in Clinical Education: A Quantitative Score Derived from a Survey of Internal Medicine Teaching Faculty. *Teaching and Learning in Medicine*, *31*(1), 53–64. https://doi-org.wvu.idm.oclc.org/10.1080/10401334.2018.1481752

MedBiquitous Curriculum Inventory Working Group Standardized Vocabulary Subcommittee. 2016. Curriculum Inventory standardized instructional and assessment methods and resource types (March 2016 version). Washington, DC: Association of American Medical Colleges. Retrieved https://medbiq.org/curriculum/vocabularies.pdf

Merriam, S.B., & Tisdell, E.J. (2016). *Qualitative research: a guide to design and implementation.* Fourth edition. Jossey-Bass Publication.

Michael, S. H., Rougas, S., Zhang, X. C., & Clyne, B. (2019). A Content Analysis of the ACGME Specialty Milestones to Identify Performance Indicators Pertaining to the Development of Residents as Educators. *Teaching and Learning in Medicine*, *31*(4), 424–433. https://doi.org/10.1080/10401334.2018.1560298

Mileder L. P. (2013). Are medical schools hesitant to teach undergraduate students teaching skills? A medical student's critical view. *Medical Education Online*, *18*, 22997. https://doi.org/10.3402/meo.v18i0.22997

Miles, M., Huberman, A., & Saldaña, J. (2020). *Qualitative data analysis: a methods sourcebook* (Fourth edition.). SAGE Press.

Mintrop, R. (2016). Design-based school improvement. A practical guide for education leaders. Cambridge: Harvard Education Press.

Morgan, H., Skinner, B., Marzano, D., Fitzgerald, J., Curran, D., & Hammoud, M. (2016). Improving the medical school-residency transition. *The Clinical Teacher, 14,* 340-343. https://doi.org/10.1111/tct.12576

O'Brien, B. C., Harris, I. B., Beckman, T. J., Reed, D. A., & Cook, D. A. (2014). Standards for reporting qualitative research: a synthesis of recommendations. *Academic medicine : journal of the Association of American Medical Colleges*, *89*(9), 1245–1251. https://doi.org/10.1097/ACM.0000000000000388

O'Keefe & Paige. (2020). Reflections on journaling: An initiate to support pre-service mathematics and science teachers. *Australian Journal of Teacher Education*, 45(4), 76-95. DOI:10.14221/ajte.2020v45n4.6

Pasquinelli, L. M., & Greenberg, L. W. (2008). A review of medical school programs that train medical students as teachers (MED-SATS). *Teaching and learning in medicine*, *20*(1), 73–81. https://doi.org/10.1080/10401330701798337

Patton, L.D., Renn, K.A., Guido-DiBrito, F., & Quaye, S.J. (2016). *Student development in college: Theory, research, and practice* (Third ed.). San Francisco, CA: Jossey-Bass & Pfeiffer.

Perry, J., Zambo, D., & Crow, R. (2020). *The Improvement Science Dissertation in Practice: A guide for faculty, committee members, and their students.* Gorham, ME: Meyers Education Press.

Qualtrics. Provo, Utah, USA. Version July, 2020 of Qualtrics. Copyright 2019 Qualtrics. Available at: https://www.qualtrics.com

Ramani, S., Mann, K., Taylor, D., & Thampy, H. (2016). Residents as teachers: Near peer learning in clinical work settings: AMEE Guide No. 106. *Medical Teacher*, *38*(7), 642–655. https://doi.org/10.3109/0142159X.2016.1147540

Rana, J., & Freret, T. (2017). Training medical students how to teach helps them embrace ambiguity. *STAT News Online.* Retrieved from https://www.statnews.com/2017/05/22/medical-students-teaching-training/

Rana, J., Sullivan, A., Brett, M., Weinstein, A. R., Atkins, K. M., & SaT Delphi Working Group (2018). Defining curricular priorities for student-as-teacher programs: A national delphi study. *Medical Teacher*, *0*(3), 259–266. https://doi.org/10.1080/0142159X.2017.1401216

Rees, E.L., Davies, B., & Eastwood, M. (2015). Developing students' teaching through peer observation and feedback. *Perspectives on Medical Education, 4*(5), 268-271.

Rudd M, Nagler A, Crumley H. (2014). Teaching triangles. *MedEdPORTAL*, *10*:9966. https://doi.org/10.15766/mep_2374-8265.9966

Schlossberg, N.K. (1981). A model for analyzing human adaptation to transition. The Counseling Psychologist, 9, 2-18. https://doi.org/10.1177/001100008100900202

Schlossberg, N.K. (1984). *Counseling adults in transition.* Springer Publishing Company.

Sensoy, O., & DiAngelo, R. (2012). Is everyone really equal? An introduction to key concepts in social justice education. Teachers College Press.

Sheu, L., O'Sullivan, P. S., Aagaard, E. M., Tad-Y, D., Harrell, H. E., Kogan, J. R., Nixon, J., Hollander, H., & Hauer, K. E. (2016). How residents develop trust in interns: A multi-institutional mixed-methods study. *Academic Medicine: Journal of the Association of American Medical Colleges*, *91*(10), 1406–1415. https://doi.org/10.1097/ACM.0000000000001164

Song, C., Davis, B. J., & Lambert, D. R. (2015). The medical education pathway: Description and early outcomes of a student-as-teacher program. *Academic medicine: Journal of the Association of American Medical Colleges*, *90*(4), 458–461. https://doi.org/10.1097/ACM.0000000000000548

Soriano, R. P., Blatt, B., Coplit, L., CichoskiKelly, E., Kosowicz, L., Newman, L., Pasquale, S. J., Pretorius, R., Rosen, J. M., Saks, N. S., & Greenberg, L. (2010). Teaching medical students how to teach: A national survey of students-as-teachers programs in U.S. medical schools. *Academic Medicine: Journal of the Association of American Medical Colleges*, *85*(11), 1725–1731. https://doi.org/10.1097/ACM.0b013e3181f53273

Stenfors-Hayes, T., Hult, H., & Dahlgren, M. A. (2013). A phenomenographic approach to research in medical education. *Medical education*, *47*(3), 261–270. https://doi-org.www.libproxy.wvu.edu/10.1111/medu.12101

Sullivan, P.B., Buckle, A., Nicky, G., & Atkinson, S.H. (2012). Peer observation of teaching as a faculty development tool. *BMC Medical Education, 12*(26), 1-6. https://doi.org/10.1186/1472-6920-12-26

Tchekmedyian, V., Shields, H. M., Pelletier, S. R., & Pazo, V. C. (2017). The effect of rubric-guided, focused, personalized coaching sessions and video-recorded presentations on teaching skills among fourth-year medical students: A pilot study. *Academic Medicine: Journal of the Association of American Medical Colleges*, *92*(11), 1583–1589. https://doi.org/10.1097/ACM.0000000000001686

Walzak, Al., Butler, D., Bates, J., Farrell, L., Law, S.F.B., & Pratt, D.D. (2019). Working in the dead of night: Exploring the transition to after-hours duty. *Medical Education, 53*(3), 296-305.

Walzak, A., Butler, D., Bates, J., Farrell, L., Law, S., & Pratt, D. D. (2019). Working in the dead of night: exploring the transition to after-hours duty. *Medical education*, *53*(3), 296–305. https://doi.org/10.1111/medu.13762

Wenger, E. (1998). *Communities of Practice. Learning, Meaning and Identity.* Cambridge University Press.

Wenger-Trayner, E., Fenton-O'Creevy, M., Hutchinson, S., Kubiak, C., & Wenger-Trayner, B. (2015). *Learning in Landscapes of Practice: Boundaries, identity, and knowledgeability in practice-based learning* (1st ed.). Routledge. https://doi.org/10.4324/9781315777122

West Virginia University (2016). Strategic Plan. Retrieved from: https://medicine.hsc.wvu.edu/media/364462/som_strategic_plan_63017-002.pdf

West Virginia University. (2019). *Mission and Vision.* Retrieved from: https://medicine.hsc.wvu.edu/charleston/about/mission-and-goals/

West Virginia University. (2020). School of medicine outcomes for the competent and reflective physician. Retrieved from https://medicine.hsc.wvu.edu/dme/students/md-curriculum/som-md-competencies/

Yeung, C., Friesen, F., Farr, S., Law, M., & Albert, L. (2017). Development and implementation of a longitudinal students as teachers program: participant satisfaction and implications for medical student teaching and learning. *BMC Medical Education*, *17*(28). https://doi.org/10.1186/s12909-017-0857-8

Yoon, M. H., Blatt, B. C., & Greenberg, L. W. (2017). Medical students' professional development as educators revealed through reflections on their teaching following a students-as-teachers course. *Teaching and Learning in Medicine*, *29*(4), 411–419. https://doi.org/10.1080/10401334.2017.1302801