1-1-2018

Individualized Learning Plans And Performance Measurement, Management, And Improvement In Premedical Post Baccalaureate Education

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INDIVIDUALIZED LEARNING PLANS AND PERFORMANCE MEASUREMENT, MANAGEMENT, AND IMPROVEMENT IN PRE-MEDICAL POST BACCALAUREATE EDUCATION

by

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DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2018

MAJOR: LEARNING DESIGN & TECHNOLOGY

Approved by:

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Advisor Date

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DEDICATION

In memory of Dr. Silas Norman, Jr. (1941-2015), Associate Dean of Admissions, Diversity, and Inclusion at Wayne State University School of Medicine. A mentor, friend, and role model who is truly missed.

Tyler Elise Robinson

Dream big, **develop a plan**, work hard, and take what belongs to you.

~Auntie

ACKNOWLEDGEMENTS

Dr. Ingrid Guerra-López,

You said I was going to be the expert so now, I must start believing you. Your support and guidance are invaluable. I thank you for your patience and commitment.

Matt Jackson,

Thanks for getting me through this process.

William and Sheryl Robinson also known as Dad and Mom,

I think I am done with school now! Thank you for being shining examples and making the path possible and the obstacles invisible.

Ashara,

This page exists simple because you made me apply *again*. And, you said I could do it.

The Office of Diversity and Inclusion, School of Medicine, Wayne State University,

The best place for love, life, laughter, levity, and great staff support. To De'Andrea and Joe, my sister and brother from other mothers:

Office of Student Affairs, School of Medicine, Wayne State University,

Work is the place we spend most of our lives. If we are lucky, we get to meet some pretty cool people who often become family. Student Affairs is the one location that I spent the most time in one place! Your support, belief, and unconditional love got me through some trying times. Allison, Benita, Carolyn, Julian, Kate, Loretta, Lynette, Margit, Mike, Nicole, Steve, and Tracey-Thank you so very much.

Finish Line,

When I did not believe, could not conceive, and wanted to leave, I had my peers, confidantes, and writing buddies. Truly WAKANDA FOREVER. I love y'all so much. Caroline, Cheryl, Darryl, Ebony, Mike, Patricia, Tiana, Yvette, and Zsa-Zsa. Together we represent a Talented Tenth. I look forward to what is next for all of us individually and collectively.

People pay attention!

Nicole, Mylitta, and Jameshia,

Your support and friendship arrived at critical times.

Asante sana, merci, arigato gozaimasu, gracias, enkosi, shukraan, gamsahamnida

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CHAPTER 1 INTRODUCTION

BACKGROUND

The Association of American Medical Colleges (AAMC) predicts that there will be a shortage of 46,000 to 90,000 physicians by 2025 (AAMC, 2015). The training of physicians is a multi-year commitment with four years of undergraduate training and residency training ranging from 3 to 6 years. Physicians gain expertise in their areas of specialization and need to continue to develop professionally throughout their career. Additionally, residents must gain competence in the Accreditation Council for Graduate Medical Education's (ACGME) six domains of patient care: 1) medical knowledge, 2) patient care, 3) professionalism, 4) systems-based practice, 5) practice-based learning and improvement, and, 6) interpersonal and communication skills (ACGME, 2013). Physicians develop and sustain competence in these six domains while keeping skills current or developing advanced acumen and expertise in subspecialties.

This continuous performance improvement and commitment to lifelong learning is beneficial to providing quality health care and superior diagnostic services. Lifelong learning is a medical professional mandate adopted by more than 120 health care agencies worldwide (Davis, Mazmanian, Fordis, Van Morrison, Thorpe, & Perrier, 2006; Li, Paterniti, Co, & West, 2010b; Li, Paterniti, Tancredi, Co, & West, 2011). This mandate requires that physicians, medical trainees, and medical students be self-regulating, self-directed, and responsible learners who are self-aware, reflective, honest with their self-assessment, and capable of change (Zimmerman, 2002). Self-assessment and self-directed learning are central to effective lifelong learning (Li, Tancredi, Co & West, 2010a; Li & Burke, 2010c).

While physicians, residents in training, and various other health care practitioners must be self-directed in their training and professional development, physicians and residents are often not

proficient in self-assessment and not taught to cultivate self-directedness while in training and in practice (Norman, 1999; Gordon, 1991; Violato & Lockyer, 2006). Self-assessment and self-directed learning are not innate skills and must be learned through training and deliberate practice (Li et al., 2010a). Physicians do not have the skills to effectively engage in self-directed learning and have limited experience in self-directing their own learning (Li et al., 2010b). Moreover, "the perception of skill is only modestly correlated with actual level of skill performance, a pattern found not only in the laboratory, but also in the classroom, health clinic, and the workplace" (Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2007, p. 98). The poorest performers, across many intellectual and social domains, have the *least accurate assessment of skills and performances* (Kruger & Dunning, 1999). Physicians, like any other profession, are poor assessors of their own skills and knowledge. Physicians with the most confidence but the least skilled are also the least accurate in personal assessment when compared to external assessment (Langendyk, 2006; Violato & Lockyer, 2006).

The health care industry predicts strong job demands into 2025 that may strain the health care system. The expansion of health insurance coverage, medical innovations, technological advances, and the projected distributional imbalance of nurses in at least 16 U.S. states (American Association of Colleges of Nursing, 2015) combined put an additional strain on the health care system. Highly trained, *insightful* practitioners and more specifically, teams of qualified and insightful practitioners, are necessary to provide quality health care for all. The complexity of medicine and the use of high tech tools coupled with time constraints placed on physicians in an overburdened and flawed health care system has resulted in a decrease in traditional hands-on skills of physical diagnosis (Boodman, 2013). Well-developed self-assessment skills are needed to ensure quality health care, promote good practice, good habits, and evidence-based medicine.

Insight is the ability to recognize personal strengths and weaknesses and influences the ability to accurately self-assess. It is the accurate view of oneself. A multifaceted concept, insight is the ability to discern when one's skills and knowledge are a liability, overused, or in need of fine-tuning (London, 2002). Accurate self-assessment, however is very difficult to attain as people tend to (a) overestimate their abilities, (b) be overconfident in their skills and knowledge, and (c) have a propensity to report their abilities as above average (Dunning, Heath, & Suls, 2004; Kruger & Dunning, 1999; Ehrlinger et al., 2007; Caputo & Dunning, 2005).

A physician's lack of insight may be due to one or more of the following: lack of exposure, experience, or interest in a disease, disorder, or dysfunction as well as limited interaction with a specific patient population in which specific health issues are prevalent. This lack of insight may contribute to diagnostic error. Diagnostic errors are common in primary care settings. These errors were related or associated with flawed thinking coupled with negligence (Boodman, 2013). Misdiagnosis accounts for 10-20 % of delayed or incorrect treatments, surgeries, or drug therapy (Boodman, 2013). The leading cause of medical malpractice claims was diagnostic error and is estimated to cause 40,000-98,000 deaths a year in the U.S. (Singh, Giardina, Meyer, Forjuoh, Reis, & Thomas, 2013).

There are many causes of physician error: e.g., flawed thought processes, incomplete job processes, procedures, multiple distractions, workflow interruptions, foregoing simple procedures based upon gut feelings, and compromised emotional states (Groopman, 2007). Unless a lawsuit is filed, the physician is often unaware of the mistakes they made, as patients simply leave their practice to seek different treatment or get a second opinion (Boodman, 2013).

Studies show that physicians failed to report a differential diagnosis that would not only stipulate what is wrong with the patient but list the other potential causes of the problem based on physical

exam, symptoms, and test results (Groopman, 2007; Boodman, 2013). Moreover, diagnostic errors made by physicians have been understudied (Singh et al., 2013). More importantly, health care reform is driving a transformation in medical education, "shifting the paradigm from centers of learning to learning health systems, committed to improvement of health and health care through advancing, applying, and disseminating knowledge" (Grumbach, Lucey, & Johnston, 2014, p. 1109).

PROBLEM STATEMENT

While knowledge acquisition is important, medical schools and accrediting agencies are focusing more on outcomes. Medical performance, what a physician can do accurately, repeatedly, and consistently is more significant than what they know. "Regardless of training, experience, or education, roughly 7% to 28% of medical trainees will require remediation in the form of an individualized learning plan to achieve competence" (Guerrasio, Garrity, & Aagaard, 2014, p. 352). Very little research on remediation for medical students, trainees, fellows, or practicing physicians exists in the literature. The available research focuses on specific skill attainment but lacks a standard methodology for identifying (a) those who are not competent and, (b) remediation strategies necessary to close deficiencies (Hauer, Ciccone, Henzel, Katsufrakis, Miller, Norcross, Papadakis, & Irby, 2009).

Monitoring physician competence is virtually nonexistent as very few organizations provide systematic monitoring of physician performance. Neither hospitals nor physicians have adequately identified and addressed performance problems (Neff, 2000) nor reported errors made by clinicians or hospitals (Graber, 2005). Discovering an impaired medical professional may take more than ten years to identify. Such delay is costly and detrimental to the public health at large. Poor physician performance is not rare (Loeb, 2004) and measuring health care performance is

problematic. In 2014, 20% of physicians failed the Internal Medicine Maintenance of Certification (MOC) exam (ABIM, 2014). This 20% had practiced medicine for ten years or more. In addition, hospitals tended to lack formal structures to monitor and correct physician performance and expected that their participation in professional development activities fixed any deficiencies. Practicing physicians are not required to submit to drug testing or annual physical exams.

A review of the literature revealed the need to identify problems early and address solutions in a timely fashion. Both undergraduate and graduate medical education need to have remediation steps in place. Medical students, residents, and practicing physicians in difficulty will have deficiencies in more than one competency area (Dupras, Edson, Halvorsen, Hopkins, & McDonald, 2012). Very few research studies revealed ways to identify and address performance issues in undergraduate and graduate medical education. Helping students learn to be self-directed and self-assessing can occur early in undergraduate education (Knowles, 1975). Yet little has been done to teach students to be self-regulating and take responsibility for their own learning (Zimmerman, 2002). Identifying self-regulating processes and their application to teaching and learning in clinical and academic medicine is also missing in the literature (Sandars, 2012).

Research suggested individualized learning plans (ILPs) increase accountability from both educational and governmental institutions on program outcomes and competency assessment (Irby & Wilkerson, 2003). The ILP has five components: 1) self-assessment of strengths and weaknesses as well as a reflection on career goals; 2) generations of goals; 3) a plan to achieve goals; 4) assessment of progress towards goals and; 5) revising goal or plan based on the assessment (Li & Burke, 2010c). ILPs provide the opportunity to develop and monitor goals. Progress monitoring is an effective self-regulation strategy. Similarly, individualized development plans (IDP) are used by federal agencies to track employee progress and provide support for career development and

promotion. Graduate programs funding students through National Institutes of Health (NIH) and National Science Foundation (NSF) support are required to submit IDPs as an annual performance appraisal and evaluation. Preliminary research showed that ILPs in medical education helped to improve self-regulated learning needed later in a physician's career (Stuart, Sectish, & Huffman, 2005).

Few research studies have explored the viability of ILPs. Extant research shows ILPs have promise and application in both undergraduate and graduate medical education, indicating a need to use ILPs earlier in the educational pipeline. Yet, very little in this literature explored personalized or individualized learning plans based on assessment data despite current medical and science education reform calling for it (Hauer et al., 2009; Norman, 2004; Irby & Wilkerson, 2003). Documented use of ILPs began in 2007, when U.S. pediatric residency programs implemented an electronic ILP called *Pedialink*. There is no research in undergraduate medical education, and none exists on pre-medical post baccalaureate programs. As such, it is not yet clear if participating in a pre-medical post baccalaureate program (PPB) designed to academically enhance subsequent medical school application will result in obtaining the greatest benefit from using ILPs.

Pre-medical post baccalaureate programs have existed for more than 45 years in the United States and vary widely in academic content, rigor, affiliation with medical school, and populations served (Koenig, 2014; Wides, Brody, Alexander, Gansky, & Mertz, 2013). In general, it is believed that post baccalaureate programs allow students to explore personal academic interests that were not accommodated in the undergraduate curriculum and, pursue additional credentialing or certificates, or prepare for admission into professional school such as nursing, business, law, dentistry, or medicine. Specifically, some post baccalaureate programs are deliberately designed

for students whose application was initially rejected from professional school. Post baccalaureate programs may provide the opportunity to explore future career goals, and ILPS may be used to track and monitor career goals of professionals in industry. There may be valued added to post baccalaureate programs if a professional development tool is repurposed earlier in the educational pipeline.

RESEARCH QUESTIONS

The purpose of this research study was to better describe and understand the development and use of individualized learning plans (ILPs) in a pre-medical post baccalaureate (PPB) program using performance measurement, management, and improvement proposed by Guerra-López and Hutchinson (2013) and grounded theory. Students in a pre-medical post baccalaureate program should be able to create goals related to career exploration and pre-medical coursework required in the program. This study looked at the use of ILPs as both a process and an outcome and asked the following questions:

1. How is a sustainable ILP developed?
    a. What are the challenges to designing, developing, and implementing an ILP for pre-medical post baccalaureate students?
    b. What types of goals do students in a post baccalaureate program develop and how are they used to enhance their development?
2. What impact does an ILP have on students?
    a. How does an ILP promote self-assessment, self-directedness, or self-regulated learning?
    b. What impact does an ILP have on student academic performance?
3. What are students' attitudes towards individualized learning plans (ILP)?

STUDY PURPOSE

This study examined the adaptation of the ILP, a professional development tool, in the educational training of post baccalaureate students aspiring to get into medical school. Recent literature recommended personalized learning plans in: (a) teaching science (Litchfield, Mata, & Gray, 2007), (b) medical education (Rye, 2008; McDermott, Curry, Stile, and Martin, 1999; Shepard, Sastre, Davidson & Fleming, 2012) and; (c) medical career advising (Reed, Schifferdecker, & Turco, 2012).

This mixed method research explored the planning and development of academic and personal goals set by pre-medical post baccalaureate students. Students in a pre-medical post baccalaureate program developed and used an ILP as they complete required coursework at a large Midwestern university. An examination of how professional development tools helped novices prepare for medical school may (a) help inform the development of program for training of future physicians and, (b) help identify programmatic and teaching challenges that may exist in the educational pipeline.

SIGNIFICANCE OF STUDY

It behooves physicians and physicians in training to develop mastery in self-regulation practices that positions them to leverage their individual strengths and improve their weaknesses. Such insight allows for the appropriate allocation of resources, consultation with colleagues, and training. Therefore, the development of self-regulation and related metacognitive skills must begin prior to the completion of undergraduate medical training. There are limited opportunities to develop self-assessment and self-directedness in the undergraduate medical curriculum due to its rigor and pace. Developing such skills prior to entering medical school is advantageous.

"Developing a better understanding of how to teach and learn these self-assessment and self-directed learning skills is important, because producing physicians that are better lifelong learners may improve the quality of care that patients receive" (Li, Favreau & West, 2009, p. 2). Greater accountability of schools, hospitals, and medical care has resulted in new forms of performance assessment. Medical licensure and recertification examinations have shifted from simple knowledge assessment to competency assessment (Irby & Wilkerson, 2003) in multiple domains. Practitioners are tested on their ability to integrate and adapt clinical skills and knowledge in an ever-changing field and challenging work environment.

Physicians, teachers, nurses, social workers, psychologists, and engineers are a few professions that require specialized training and a specified number of continuing education hours to keep credentials current and support applications for renewal of licensure. ILPs are used to chart career objectives, long- and short-term goals, and assessed the progress towards reaching those goals (United States Department of Agriculture, 2015) and could prove to be useful for tracking and monitoring the professional development activities for each of these professions. The ILP can provide a concise frame of reference for developing and executing a plan for career success for not only practitioners but for students as well. Emerging current literature explored the use of personalized learning plans in advanced oncology training (Herrmann, Peters, Williamson, & Rhodes, 2015), pediatric residency programs (Li et al., 2009; Li et al., 2010a, 2011; Li, Tancredi, Burke, Guillot, Guralnick, Trimm, & Mahan, 2012; Li, Paterniti, Tancredi, Burke, Trimm, Guillot, Guralnick & Mahan, 2015) and, in high school to help students "align course plans with career aspirations and often include the development of postsecondary plans" (Solberg, Phelps, Haakensen, Durham, & Timmons, 2012, p. 500).

CONCEPTUAL FRAMEWORK

Continuous performance improvement includes ongoing tracking of performance needs and the analysis of casual factors that must be managed to meet those needs. It is in understanding these factors that the best solutions may be considered and implemented (Kaufman & Guerra-López, 2012) as well as continuously monitored to make timely decisions and charges, as required (Guerra-López & Hutchinson, 2013). A Performance Measurement, Management, and Improvement framework will be scaled down to individual performance to provide each student with a mechanism for continuously measuring (assessing), monitoring (information gathering and feedback), and improving their own performance.

GROUNDED THEORY

This study does not test a hypothesis but examined the shared experiences of students using a specific tool. Such exploration required a qualitative research methodology. Over the last several years, medical education research has increasingly used qualitative research methods to explore questions that quantitative measures cannot adequately address (Watling & Lingard, 2012). Specifically, the use of grounded theory in medical education research has gained prominence as it is a systematic way to develop constructs and theory that explain human behavior. Grounded theory is an iterative cycle of simultaneous data collection and analysis requiring a method of constant comparison (Watling & Lingard, 2012) and was the research methodology of choice in this study.

STUDENT PERFORMANCE MONITORING AND IMPROVEMENT

The *process* of continuous performance improvement is an iterative cycle of assessment, evidence gathering, performance monitoring, reassessment, and performance adjustments. In addition, measurement of performance against external standards must occur throughout the cycle.

The *activities* involved in this process must be systematically tracked, monitored, reviewed, and updated. This is done to catalog the interaction between students and knowledgeable others, use of resources, strategies, and other related activities as evidence. Such a system continuously feeds decision-making produces evidence and may support the communication of value added (Guerra-López & Hutchinson, 2013).

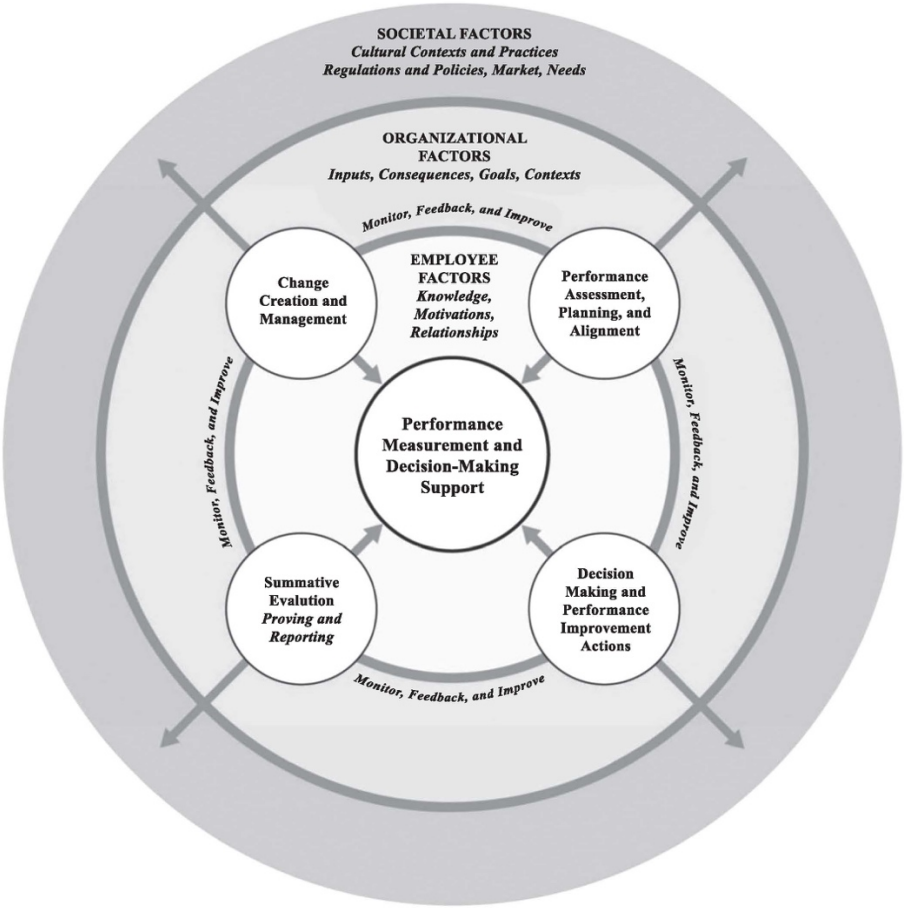


FIGURE 1. THE PERFORMANCE MEASUREMENT, MANAGEMENT, AND IMPROVEMENT SYSTEM

Guerra-López & Hutchinson, 2013 Performance Measurement and Improvement System.

PRE-MEDICAL POST BACCALAUREATE EDUCATIONAL MODEL

To date, a model for pre-medical post baccalaureate education does not exist (Grumbach, 2011). The Midwestern University Pre-medical Post Baccalaureate program is designed to

academically enhance students' preparation to medical school. A proposed pre-medical post baccalaureate model was adapted from the Hauer et al. 2009 model for performance remediation for medical residents and practicing physicians.

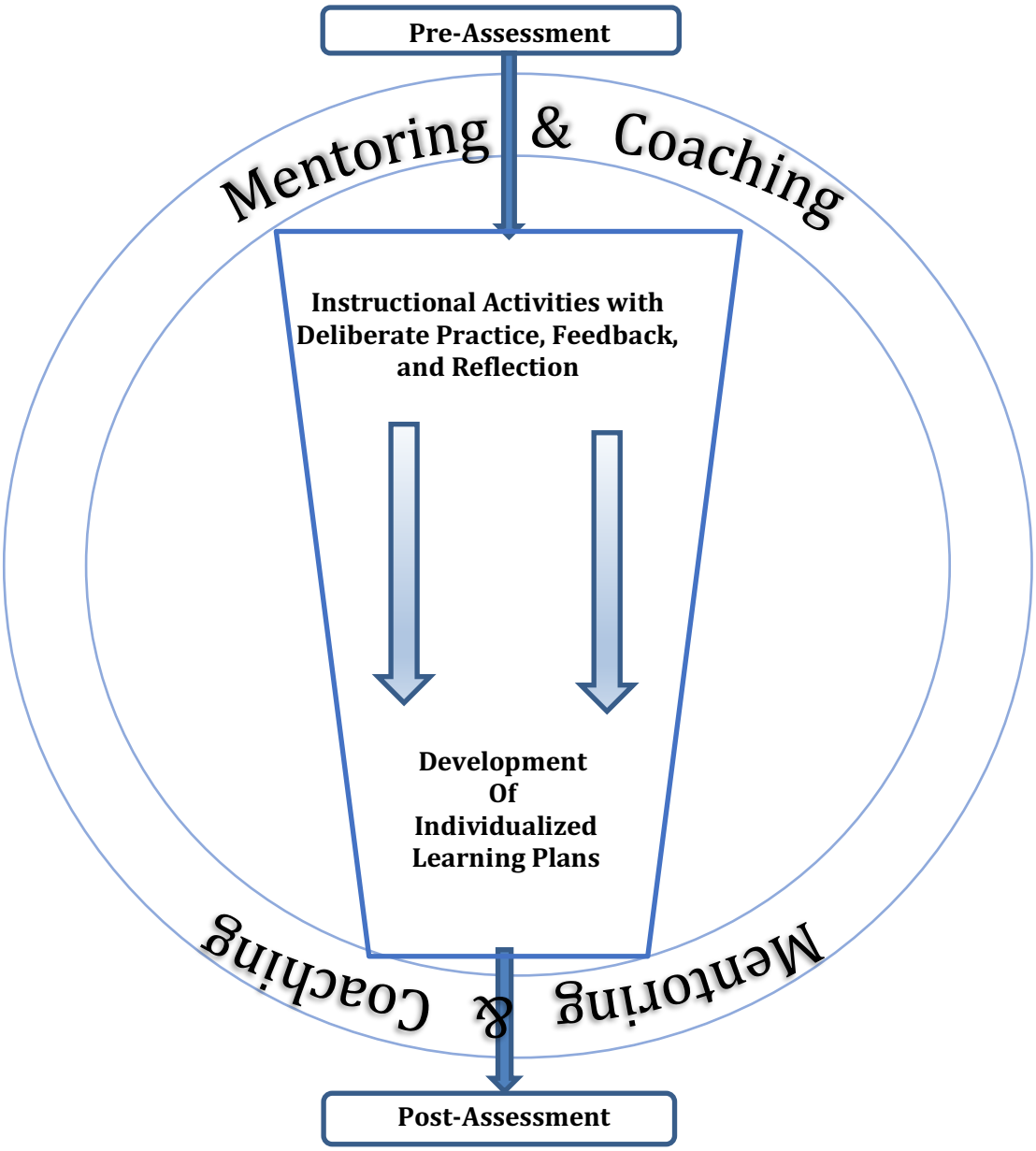


FIGURE 2. PRE-MEDICAL POST BACCALAUREATE EDUCATIONAL MODEL

Through exposure to medical school curriculum, faculty, staff, students, and facilities, the PPB program provided students with additional knowledge and skills through additional coursework (Instructional Activities), support from academic support services that included a

learning specialist, personal counselor, clinical shadowing, and guest lectures (Mentoring and Coaching). Pre- and post-assessments were conducted to evaluate the change in student performance at the beginning and end of the program. The development of an individualized learning plans was a distinct and intentional phase that allows students to reflect on their skills, habits, and educational experiences and plan for the successful completion of personal, academic, and professional goals. This phase differed from the Hauer et al. 2009 remediation model by implementing the ILP only after instructional activities begin and focused on performance goals. Furthermore, it laid the foundation for the *intentional and independent need* to develop, track, and monitor of progress towards personal, academic and professional goals.

OPERATIONAL DEFINITIONS

The Association of American Medical Colleges **(AAMC**) is the non-profit organization that administers the Medical College Admissions Test (**MCAT**) and facilitates the processes for applying to both medical school and residency programs. Its membership is comprised of all accredited medical schools in the United States (145) and Canada (17) as well as more than 80 professional societies and 400 health care systems and teaching hospitals (AAMC, 2016).

The Accreditation Council of Graduate Medical Education **(ACGME**) is the non-profit organization responsible for evaluating and accrediting post-graduate medical training programs including residencies and fellowships in the United States. Members of the ACGME include the AAMC, the American Board of Medical Specialties (ABMS), the American Medical Association (AMA), the American Hospital Association (AHA) and the Council of Medical Specialty Societies (CMSS).

Pre-medical post baccalaureate **(PPB)** programs are continuing education programs that begin after the completion of the first undergraduate degree. These programs may be formal or

informal depending on the institution. Students interested in becoming physicians often participate in additional academic preparation if their undergraduate experience did not include all the requisite coursework necessary for admission into medical school. Once admitted, Undergraduate Medical Education **(UGME)** is the initial educational training which medical students complete that includes both a basic science and clinical science component as well as successful completion of Step 1 and Step 2 of the United States Medical Licensing Examinations (USMLE). Graduate Medical Education **(GME)** is the formalized training that begins after the medical degree is completed and includes USMLE Step 3, state licensure, and board certification governed by the ACGME.

Multiple and diverse skills are needed for the successful completion of medical school and the development of expertise in medical specialties. Such skills require both time on task and deliberate practice. Deliberate practice **(DP)** is the repetitive and intentional performance of tasks structured to improve performance. The medical school axiom "see, do, teach" in which a medical student in short order will watch a procedure, perform the same procedure and teach that procedure to someone else is the basis of deliberate practice. Deliberate practice is necessary for expertise building and is accumulated more than 10,000 hours (Ericsson).

Self-directed learning (SDL) refers to the "learner's autonomy and independence in designing the learning experience" (Schwiebert, Crandall, & Brown, p. 239, 1991). Self-directed lifelong learning as mandated by the ACGME is the commitment of physicians to their own professional development and maintenance of professional competency. Self-directed lifelong learning, the ability to "learn on one's own" (Knowles, 1975), is regulated by three dimensions: sociological (independent task management), psychological (cognitive responsibility and motivation), and pedagogical (application in the educational context) (Long, 1989). These three

dimensions play off one another and work systematically towards measuring, monitoring, and improving performance.

Individualized learning plan (ILP) is a goal development, tracking, and monitoring system that uses performance assessment data to help write performance goals and it uses feedback, evidence gathering, and evaluation to accomplish established goals and create new ones.

LIMITATIONS

Sample size in qualitative research in many cases is intentionally small. The current study is conducted on a small population and research findings may not be generalizable but may help inform the development of an intervention for pre-medical post baccalaureate students.

SUMMARY

The proposed study will explore the development of ILPs in a pre-medical post baccalaureate program to examine the feasibility of using a professional development tool earlier in the educational process to encourage self-assessment, self-regulation, and self-directedness. The theoretical framework is performance measurement, management, and improvement (Guerra-López & Hutchinson, 2013) and grounded theory. This study will help inform efforts to develop interventions and programs that may enhance the preparation of students for succeeding in medical school.

CHAPTER 2 LITERATURE REVIEW

The general purpose of this study was to document and explain 1) the process of developing individualized learning plans (ILPs) for pre-medical post-baccalaureate students and 2) the outcome of their use through the lens of continuous performance improvement and evidence gathering (Guerra-López & Hicks, 2013) measurement, management, and improvement (Guerra-López & Hutchinson, 2013).

This literature review examined the extant research on ILP implementation. It begins with an overview of pre-medical post baccalaureate programs followed by a review of the literature on the changes in the health care system that impact the training and education of medical students, residents, and physicians. A description of the ILP as a monitoring and tracking system to effectively drive continuous performance improvement follows. The need for accurate, efficient, self-assessment skills is followed by the examination of literature on the role of assessment and deliberate practice on performance improvement. The application of grounded theory and human performance theory concludes the chapter.

PRE-MEDICAL POST BACCALAUREATE PROGRAMS

Pre-medical post baccalaureate (PPB) programs have existed for more than 45 years at various post-secondary institutions across the country (Andriole & Jeffe, 2011; Whitten, 1999; Jackson, McGlinn, Rainey, & Bardo, 2003). These programs vary in mission, length, academic rigor, curriculum, funding, professional school/college affiliation, clinical opportunities, and academic support. The post baccalaureate enrollment status allows students to register for courses after completing the requirements for the first baccalaureate degree as well as remain eligible for federal and state financial aid. Post baccalaureate programs may or may not 1) provide a credential after the completion of the program; 2) have an articulation agreement with a professional school

and; 3) provide direct or conditional admission to professional school up completion of the program.

McGee et al. described post baccalaureate programs as "a purposeful pause between academic milestones" (2012, p. 7). Post baccalaureate programs are education programs that provide supplemental education missed during the undergraduate experience. Two broad categories of pre-medical post baccalaureate programs exist 1) career changers and, 2) academic record enhancers (AAMC, 2016). Career changer programs provide coursework and clinical opportunities for individuals who already have an established career with unrelated educational training. Academic record enhancer programs are geared toward students who 1) did not take the necessary undergraduate prerequisites; 2) did not perform well in undergraduate studies; 3) needed skill development or; 4) made academic mistakes during their undergraduate studies (NAAHP, 2014). Students who have been rejected from medical school may enroll in an academic enhancement program. Some post baccalaureate programs fit both career changer and academic enhancer profiles.

In a study with a sample of 57, 276 medical school matriculants, PPB participants were found to be demographically diverse; women were more likely than men to participate in career changing PPB programs; and students who are underrepresented in medicine (URM) as well as students from economically and/or educationally disadvantaged (SES) backgrounds were more likely to participate in academic record enhancing PPB programs (Andriole & Jeffe, 2011).

The literature suggests post baccalaureate programs have been successful in recruiting diverse student populations that subsequently matriculate into medical and/or dental school. Cohen and Steinecke (2006) asserted that Wayne State University has the longest running PPB program designed to recruit and retain URMs. Southern Illinois University and the University of Hawaii

have PPB programs established in the early 1970's. Longitudinal research showed that pre-medical post baccalaureate programs: 1) filled a critical role in recruiting a diverse student population into the medical profession (Lipscomb, Mavis, Fowler, Green & Brooks, 2009; Andriole & Jeffe, 2011) and; 2) program participants were more likely after graduation to work and serve in underrepresented areas (Andriole & Jeffe, 2011). Such diversity is needed to address the gap in health disparities in various communities, and is significant because two-thirds of medical students come from upper class families (Grumbach, 2011).

In 2006, Cohen & Steinecke reported that the Association of American Medical Colleges (AAMC) called for a 30% increase in enrollment to offset the anticipated physician shortage (2006). By 2006, there were 76 PPB programs registered with the AAMC (Grumbach & Chen, 2006). Given the need for an increased and diverse pre-medical post baccalaureate programs often serve as a pipeline program to address access and equity gaps (Grumbach, 2011). In 2011, 16% of students admitted to medical school were PPB graduates (Andriole & Jeffe, 2011). Currently, there are 231 registered post baccalaureate programs with AAMC. In addition to preparing additional physicians, PPB programs may provide a viable option for producing health information administrators as the demand for this specialized profession is outpaced by supply (Condon & Barefield, 2012). Similarly, PPB programs may develop talent and diversity in the biomedical research workforce (McGee et al., 2012). Post baccalaureate programs have untapped potential and opportunities for workforce development.

GAPS IN THE LITERATURE

Specific information qualitatively describing the development and effectiveness of pre-medical post baccalaureate programs is limited (Blakeley & Broussard, 2003). Not much is known about how well PPB students perform academically while in medical school. No controlled studies

of educational outcomes exclusively for PPB students have been conducted (Grumbach & Chen, 2006). Pre-medical post baccalaureate programs have been successful in: 1) preparing students for the rigors of medical school (Lipscomb et al., 2009; Reeves, Vishwantha, Yorio, Budd, & Sheedlo, 2008; Manusov, Livingston, Wang Berne-Anderson, Alston, Foster & Hurt, 2011); 2) increasing the number of underrepresented in medicine (URM) and low socioeconomic status (SES) students matriculating into medical school (Whitten, 1999; Judd & Sing, 2001; Grumbach & Chen, 2006); 3) increasing diversity in the applicant pool (Blakely & Broussard, 2003; Grumbach & Mendoza, 2008; Wides, Brody, Alexander, Gansky & Mertz, 2013); and 4) increasing the number of physicians working in underserved areas (Lupton, Vercammen-Grandjean, Forkin, Wilson, & Grumbach, 2012);

HEALTH CARE REFORM

Health care faces many challenges today. These challenges include 1) a shortage of nurses, physicians, and other key hospital personnel; 2) consumers having access to a wealth of medical information via the Internet and; 3) the challenges in the prevention and treatment of chronic diseases specifically amongst low income and urban dwelling minority populations. The practice of medicine is no longer characterized by physician in solo practice diagnosing individual patients. Instead, medicine has shifted to an elaborate network of highly qualified medical teams, working in concert to prevent and manage chronic illness in various and diverse communities (Lucey, 2013). Professional development of physicians has shifted from simple acquisition of information and knowledge through attending workshops to ongoing self-assessment and practice improvement through action-based improvement plans, simulations, and deliberate practice. Undergraduate and graduate medical curricula and training programs across the country are undergoing significant transformations and incorporate quality improvement (QI) through

continuous performance improvement (CPI) (Holmboe, Prince, & Green, 2005; Batalden & Davidoff, 2007; Davis, 2009; Davis et al., 2013; Davis & Rayburn, 2016).

In 2001, the American Board of Medical Specialties (ABMS) introduced a 4-part maintenance of certification (MOC) program requiring all board-certified physicians to recertify every ten years. This MOC program changed the licensure renewal process to a ten-year renewal process that all board-certified physicians must complete to practice. Regardless of their level of training or education, 7-28% of medical trainees-students, residents, and practicing physicians, will need some type of remediation in the form of an individualized learning plan (Guerrasio, Garrity, & Aagaard, 2014). Upwards of 10% of physicians have had significant knowledge or skill deficiencies (Leape & Fromson, 2006) at some time in their career. Throughout all phases of medical education and training, the ability to identify and correct performance gaps is critical to quality health care, health systems, as well as training the next generation of physicians.

In 2002, the Accreditation Council for Graduate Medical Education (ACGME) began an initiative called the *Outcomes Project* that identified six core competencies used to evaluate residents in training. Those six core competencies are: 1) medical knowledge; 2) practice-based learning and improvement; 3) interpersonal skills and communication; 4) professionalism; 5) patient care and; 6) systems-based practice (Swing, 2002). Residents and practicing physicians are required to develop and maintain proficiency in these competencies. The integration of these competencies is accomplished through an iterative cycle of self-regulation, self-assessment, and self-directedness (Zimmerman, 2012). Recent medical school graduates will possess varying levels of competence across the six domains.

In 2005, the ACGME updated accreditation standards for continuing medical education to include physician lifelong learning, assessment, and practice performance improvement (Davis,

Davis, Johnson, Grichnik, Headrick, Pingleton, Bower, & Gibbs, 2013; Simon & Aschenbrener, 2005). Physicians are required to continue to learn and improve their medical practice over the lifespan of their career. However, little is done about developing lifelong learning in health professions curricula (AAMC &AACN, 2010). To promote continuous performance improvement, one must be able to analyze current performance against external benchmarks and commit to upholding those standards for the duration of one's profession to include periodic review and integrating new knowledge and skills when necessary. Continuous performance improvement ensures ongoing competence in any profession (Guerra, 2008).

Doctors and health care systems participate in formulating three types of diagnosis: 1) perceptual diagnosis of abnormality using visual stimuli such as X-ray or MRI; 2) medical diagnosis based on examination of the patient and; 3) performance of treatment such as surgery or drugs (Ericsson, 2004). Medical errors fall into three different domains: cognitive, personal, or organizational. Health care practitioners both individually and collectively make: 1) over- or under- estimation of findings with diagnostic tests; 2) conduct faulty or improper physical examination or technique, and; 3) experience external and/or internal situational factors such as stress or work environment that impact the diagnosis (Bordage, 1999).

Physician professional development has typically included attending conferences and workshops. However, literature suggests didactics are not effective in changing a physician's performance (Davis, O'Brien, Freemantle, Wolf, Mazmanian & Taylor-Vaisey, 1999). Medical education and training is now based on outcomes and driven by assessment that in turn drives additional learning and training. It is this continuous cycle of assessment, performance, and adjustment that will not only improve the quality of care for patients, but it will also assist in integrating news skills, attitudes, and knowledge required for proficiency at all levels of medical

training (Cooke, Irby, Sullivan, & Ludmerer, 2006). For training and professional development to be effective, "personalized educational offerings based on individual learner's response to a structured self-assessment" (Herrmann et al. 2015, p. S9) are needed.

Clinicians often participate in training and education that reinforce what they already know instead of what they need to improve (Herrmann et al., 2015). Medscape Education, the leading provider of certified continuing professional development for clinicians, nurses, and other health professional found that 50%-75% of its members have difficulty staying up to date in both their specialty and integrating new therapies into their clinical practice (Medscape, 2014). Physicians must personalize their professional development to adequately establish competence, improve performance, and provide quality health care. Research on the design, process, or impact of personalized learning in medical education is scant (Herrmann et al., 2015). One of the current recommendations for medical education reform is standardizing learning outcomes while individualizing the learning process (Irby, 2011; Hauer et al., 2009).

Training for physicians must also reflect the evidence-based practices that have emerged in this current century. The *2010 Carnegie Report* calls for better integration of the basic sciences while allowing for individualized learning experiences so that there is flexibility in both the learning process and progress towards completing competency milestones (Irby, 2011). Personalized learning 1) fosters intellectual creativity; 2) better meets the needs of learners, and; 3) demands physicians have well-developed self-directed and self-assessment skills (Lambert, Lurie, Lyness, & Ward, 2010). In 2013, the American Medical Association (AMA) led a $11 million initiative to improve health outcomes for patients and accelerate change in medical education with one of those innovations being the development of "new methods for teaching

and/or assessing key competencies for medical students and fostering methods to create more flexible, individualized learning plans" (Skochelak, 2013).

INDIVIDUALIZED LEARNING PLANS (ILPS)

To successfully complete residency training, board certification, and maintenance of certification, physicians must document lifelong learning. While the training of physicians requires that they become lifelong learners, very little is addressed in the health care curriculum in developing this skill (Peter, 2005; White, 2007; Skinner, Saylors, Boone, Rye, Berry, & Kennedy, 2015). Individualized learning plans (ILPs) are designed to help promote and foster self-directed lifelong learning and may be used to gather evidence of lifelong learning as ILPs are used to help "residents assess their own learning needs, create learning goals, and document progress toward achieving those goals (Li et al., 2010, p. 1229).

Li and Burke (2010c) outline the basic elements of an ILP to include: "1) a reflection on long-term career goals and self-assessment of areas of strength and weakness; 2) goal generation, 3) development of plans/strategies to achieve the goals; 4) assessment of progress on goals and; 5) based on assessment, revising goal/plan or generating a new goal." (p. 289). A key component to the ILP is the "committing to a goal and developing an organized plan by writing it down." (p. 290). The challenge of self-directed learning is not just assessing weaknesses and setting specific goals to improve those weaknesses but developing and implementing realistic plans to accomplish those goals. Goal setting is difficult and "both unfamiliar and important concept in medical education" (Schwiebert et al., 1991, p. 240).

In the United Kingdom, personalized learning plans (PLP) and Australia, personalized development plans (PDP) have been introduced across the medical education continuum-from undergraduate medical training through professional development of seasoned physicians for in-

service assessment as well as part of the continuous performance improvement process (Challis, 2000). In 2007, pediatric residency programs use an online platform *Pedialink* to help residents build their ILP (Li et al., 2009). In a few studies, Li et al. (2009) focused on various facets of ILP implementation and use in U.S. pediatric residency programs and concluded that more scholarship on ILP needs to be conducted. Specifically, the research indicated the need to 1) test the effectiveness in the development of self-directed learning skills (Li et al., 2011); 2) examine the expansion of ILP use in other residencies as well as MOCs (Li et al., 2015); 3) examine the relationship between learner characteristics and effective lifelong learning (Li et al., 2010a); 4) determine the type of goals chosen by residents as areas of improvement (Li et al., 2012); 5) propose a conceptual model for self-directed lifelong learning assessment (Li et al., 2010b) and; 6) understand resident and faculty skills and attitude toward self-assessment and self-directed learning (Stuart et al., 2005).

The ILP is a valuable tool as it is malleable to meet various learning goals as well as various learning styles (Li et al., 2009 & 2010b). Not all students arrive to medical school with the same level of education or coping skills. It is likely that some students will have difficulty in medical school, residency training, and/or practice. An ILP may be a tool to monitor, measure, and manage performance along the educational continuum from medical school, to residency, and practice.

The ILP is an assessment tool in a larger assessment cycle of documenting evidence of employee competence and planning for future professional development (Eisele, Grohnert, Beausaert & Seger, 2013). Its application is widespread in medicine, education, business, and government. Governmental use of ILP is encouraged for continuous professional development as well as salary adjustment and promotion. ILPs are used to customize resident medical education but little application has been done in undergraduate medical education (Chitkara, Satnick, Lu,

Fleit, Go, & Chandran, 2016). To maximize successful utilization, support should be given to students, faculty, and staff to develop and achieve ISMART goals (Chitkara et al., 2016). Beausaert et al. (2013) posit that "learning and reflection, instruction and feedback, and a motivating supervisor" are the three environmental conditions that support skill development (p. 528). ILP implementation and maintenance needs support (Beausaert, Segers, van der Rijt, & Gijselaers, 2011).

The academic challenges of medical education, the volume of information, pace of instruction, and veracity of detail requires learners to possess many metacognitive skills to be successful. Medical education into the 21st century includes understanding continuous quality improvement, continuous professional development, and specific and related metacognitive skills such as insight and self-assessment. Competence in these skills requires deliberate practice. ILPs provide evidence of deliberate practice when used as a log (product) and as a learning tool (outcome). Monitoring is an essential activity "that intervenes between intention formation and goal attainment" (deBruin, Sheeran, Kok, Hiemstra, Prins, Hospers, & van Breukelen, 2012).

Monitoring goal progress is an essential element in intervention, remediation, and clinical practice. To effectively do so requires "the ability to identify discrepancies between the current state and the desired state and when and how to apply additional effort to reduce discrepancies" (Harkin, Webb, Chang, Prestwich, Conner, Kellar, Benn, & Sheeran, 2016, p. 19). While progress monitoring is essential, its impact on goal attainment lacks empirical evidence (Harkin et al., 2016). Additional work by Beausaert et al. (2011, 2012, 2013) shows that ILP implementation is problematic and the tools effectiveness shows inconclusive results and contradictory results. Previous studies have shown that "learners have difficulty developing and attaining personal goals" (Reed, Lockspeiser, Burke, Gifford, Hanson, Mahan, McKenna, Rosenburg, & Li, 2015);

does not stimulate users to plan future learning activities (Orland-Barak, 2005); learning plans are not well accepted in general practice (Garth, Kirby, Silberberg, & Brown, 2016). Students felt ILP required too much work and perceived as busy work (Larsen, Naismith, & Margolis, 2017).

INSIGHT

People tend to hold positive images and beliefs about themselves even when presented with information to the contrary (Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2007). In addition to rating oneself above average, individuals are overconfident in their abilities, particularly those who perform in the bottom quartile. At this level, the development of insight is hindered because individuals lack adequate external feedback that would improve performance (Hays et al., 2002), and learners are unable to recognize superior performance or mistakes made (Dunning, Johnson, Ehrlinger, & Kruger, 2003) or do not want to admit that the quality of their performance is substandard (Ehrlinger & Dunning, 2003).

Kruger & Dunning (1999) proposed that the possible lack of insight in students who do not perform well was due to poor metacognition and the remedy involved a few solutions including improving one's level of skill and metacognitive skills. However, Krajc & Ortman (2008) argued that is not incompetence that blinds low performers of their objectivity but unskilled individuals have a more difficult time with inference. Those in the bottom of the performance quartile have difficulty contextualizing their low performance in relation to the performance of their peers. Therefore, the lack of feedback and information about actual position on the curve makes it difficult for those in the bottom to see that their performance is poor. However, additional research conceptualizes situation-specific self-awareness in which individuals in difficulty were aware of their lack of knowledge and altered their behavior accordingly (Eva & Regehr, 2007).

Insight is important because it can change over time and coupled with motivation provides the capacity to change performance (Hays et al., 2002). Therefore, individuals who lack insight may also lack the capacity to change their performance. Physicians and medical students with low insight may not be aware of how their performance compares to: 1) their peers and; 2) acceptable levels of competency, putting patients at risk. Insight is an awareness of one's performance in the spectrum of medical practice and a combination of three constructs 1) awareness of one's own performance; 2) awareness of the performance of others and; 3) capacity to reflect on both and make a judgment (Hays, Jolly, Caldon, McCrorie, McAvoy, McManus, & Rethans, 2002).

SELF-ASSESSMENT

Self-assessment helps to identify both strengths and weaknesses so that healthcare professional know how to function within the medical practice, perform daily roles with confidence, and set learning goals to improve deficits and close professional gaps. "Self-assessment and self-directed learning are essential to lifelong learning, medical professionalism, and becoming an effective physician" (Li et al., 2012, p. 445). Self-assessment may enhance efforts to develop professional practice when it occurs predictively, concurrently, and summatively (Eva & Regehr, 2005). Predictive assessment provides information that directs the current and future demands of the practice. Summative assessment aligns general abilities against specific standards in comparison to their best overall performance, the performance of their peers, and/or to that of industry gold standards. Such an assessment helps to determine if there is room for improvement. Concurrent self-assessment functions as a monitor of progress during the performance of a task to evaluate the fidelity of the task and the direction of the performance. Concurrent assessment makes judgment about appropriate resource allocation.

Assessment in medical school and post-graduate training is used to "certify the competence of future practitioners, discriminate among candidates for advanced training, provide motivation and direction for learning and judge the adequacy of training programs" (Epstein & Hundert, 2002, p. 226). Medical school graduates complete their initial training with varying degrees of strength in the six areas of professional competence. To strengthen these competencies as well as to close any potential deficiencies, gaps must be identified, goals generated, a plan to complete those goals devised, and monitoring of the activities and strategies constructed in the plan.

Self-assessment is a process of interpreting data about one's own performance and comparing it to an explicit or implicit standard. The accuracy of self-assessment, particularly in health care, education, and the workplace may at times become distorted as there is a tendency for individuals to overrate their abilities, and be overconfident in their judgments (Dunning, Heath, & Suls, 2004). Such overestimation leads to an unrealistic optimism in which people have an overinflated worldview about their own skills, expertise, and character (Dunning et al., 2004). The danger of overconfidence posits that those with the least amount of skills believe they are above average in performance, knowledge, and skill.

Self-assessment is not a stable skill but one that is specific to content, context, (Eva & Regehr, 2005) and deliberate practice (Ericsson, 2004). Accurate self-assessment can be difficult due to a host of psychological defenses used to protect the ego. While poor performers have a harder time with successfully remediating (Durning, Cleary, Sandars, Hemmer, Kokotailo, & Artino, 2011), faulty self-assessment can be corrected through intervention (Dunning et al., 2004). "Program directors reported that residents rarely possess self-awareness to identify their own deficiencies" (Dupras et al., 2012, p. 424). The current nature of medical education leaves little room for learning or improving this skill.

DELIBERATE PRACTICE AND EXPERTISE BUILDING

Competence is gained over time when active engagement is focused on improving a task (Ericsson, 2008). The development of medical knowledge and skill into expertise occurs through multiple psychological processes over a prolonged period. These time-dependent processes were termed as deliberate practice (Ericsson, Krampe, Tesch-Römer, 1993). Deliberate practice is the intentional rehearsal and interaction with skills, knowledge, and attitudes necessary for a given profession (Ericsson, 2002). Deliberate practice improves performance when full effort in skill acquisition is based on 1) a task with a well-defined goal, 2) there is adequate motivation to improve, 3) feedback is given and, 4) opportunities for repetition and performance refinement occurs. Additionally, deliberate practice sets in motion new goals coupled with higher performance standards. The ability to evaluate and monitor performance as well as identify and analyze errors to continue the iterative process of practice with new goals each time is what distinguishes deliberate practice from every day activities.

Every day activities take a relatively short period of time to learn, assimilate, and automate. By contrast, expertise-superior reproducible performance takes a long time to acquire and fine-tune through a gradual process (Ericsson, 2004). Improving performance above current attained level may therefore involve employing different strategies and problem-solving skills (Ericsson, 2004). To develop and maintain expertise, physicians need to integrate new technologies and innovations into their daily activities that improve diagnosis and treatment in their specialties (van de Wiel, Van den Boscche, Janssen, & Jossberger, 2011). In medicine, the ideal conditions for performance improvement and the acquisition and maintenance of expert performance is specialized training and feedback (Ericsson, 2004). The medical education milieu is one of

deliberate practice, situated cognition, and cognitive apprenticeship, where the hospital, clinic, patient, and disease all provide opportunities to learn, practice, develop, and problem solve.

The educational modalities that incorporate deliberate practice in medicine are simulations, chart audits, objective standardized clinical exams (OSCE), case studies, case-based and problem-based learning (PBL). Such activities allow for practice with real life work problems without doing harm to patients. Deliberate practice lends itself to continuous performance improvement as it is intentionally focused, reflective, and self-directed in nature.

Deliberate practice optimizes educational opportunities as it is planned and protected learning time, includes supervision and feedback from other experts, and focuses on a skill or set of skills (Cook, Graff-Baker, Moren, Brown, Fair, Kiraly, De La Melena, Pommier, & Deveney, 2015). Deliberate practice occurs in residency and advanced training through various job tasks and procedures assigned as part of that training. Most importantly, deliberate practice is discussed at the graduate medical education level-after the completion of medical school. A CINHAL literature search (2000-2015) Medline (13) PsycINFO (9) yields only two articles that discussed deliberate practice at the undergraduate medical education level.

GROUNDED THEORY

Grounded theory is a qualitative approach used to explain phenomena, discover patterns, and identify categories and concepts from text. More specifically, it is a systematic approach to qualitative analysis that has been used increasingly in medical education (Kennedy & Lingard, 2006). In this study, grounded theory is used to explain the process of goal tracking, monitoring, and improving for Pre-medical post baccalaureate students. Grounded theory "involves a cycle of simultaneous data collection and analysis in which the results of the ongoing data analysis inform the subsequent data collection" (Kennedy & Lingard, 2006, p. 103). Themes emerge from a

constant review and comparison of the multiple ILP submissions amongst the students as well as across the monthly submissions. Those ILPs that have the same theme should be collected and analyzed identifying analytic categories. Using the relationships between the categories should help to build a theoretical model. A major weakness in the approach is researcher bias. Often the researcher has already developed preselected themes and apply those preselected themes over emergent ones that should naturally result from the analysis. According to Charmaz (2006), "grounded theorists collect data to develop analysis for the beginning of the project" (pg. 2). An advantage of grounded theory is explicit guidelines on how to proceed with research findings as they emerge from the process. The literature suggests very little theory has been developed from the approach (Kennedy & Lingard, 2006).

PERFORMANCE MEASUREMENT AND MANAGEMENT

A performance improvement approach is grounded in "the science and art of improving people, process, performance, organizations, and ultimately society" (Van Tiem, Moseley, & Dessinger, 2012, p. 5). Performance improvement focuses on two things: the process that makes performance better and; the actual improved performance (Van Tiem, Moseley, Dessinger, 2012). Performance improvement focuses on value-added practices through both systemic and systematic approaches (Stolovitch & Keeps, 1999). It engages a systemic approach to identifying performance gaps and designing, implementing, and evaluating performance solutions.

Performance is defined as the accomplishment or result of an individual or organization that adds value (Watkins & Wedman, 2003). To focus on performance and its improvement is to examine the processes and outcomes that add value to people, organizations, and society. Needs assessment is a key component in performance improvement as it identifies measurable gaps in performance and clarifies the needs to be addressed through performance improvement initiatives

or efforts. When physicians self-assess their performance in daily activities they are identifying gaps in their own performance. When hospitals assess the effectiveness of the system on patient care they are identifying performance gaps in not only individual physician performance but interrelated systems and health care processes. The process that determines the value or worth of something is evaluation (Scriven, 1967). From a formative perspective, evaluation helps us track progress toward performance targets and re-adjust as required throughout (for example, throughout an educational program). Specifically, ongoing performance measurement supports both managing and improving performance (Rummler, 2004; Guerra-López, 2008). To see progress on a performance goal, there must be ongoing, timely, and accurate feedback. From a summative perspective, evaluation helps us measure what was accomplished because of a program, effort, or initiative, and in turn gives us the basis for formulating our interpretations of "value."

Performance measurement starts with assessment and planning and is the prerequisite for performance management (Nathan, 2009). For performance management to be effective, performance measurement systems need to: 1) continuously influence decision making and; 2) produce evidence of valued added (Nathan, 2009). Value added means that there is attention to quality improvement, quality control, and professional accountability that does not just look at the individual performance of the physician but the performance of the health care system at large (Kaufman, 2012). Needs assessment for medical residents is determined by examining student work product and periodic evaluation by their superiors. For hospitals, tracking the progress of physicians is an important aspect of evaluating performance.

"Performance management that drives measurable performance improvement is a set of integrated activities that moves beyond mere performance appraisal to strategically managing and measuring original performance within a hierarchy of goals" (Guerra-López & Hutchinson, 2013,

pg. 164). Management calls for continuously monitoring of the gaps between goals and actual performance. Continuous monitoring of performance requires a system that can be both a process and a product.

Monitoring alone does not improve performance. “Feedback must be communicated back to those who are accountable for the performance results” (Guerra-López & Hutchinson, 2013, p. 166). The value of performance management to any organization depends on the relationship between human performance, organizational result, and external impact. Monitoring systems provide performance data and timely feedback (Guerra-López & Hicks, 2015). Monitoring and evaluation systems or performance measurement and management systems provide relevant and ongoing feedback and highlight how change is happening, in what degree, and direction.

OPPORTUNITIES FOR PERFORMANCE MEASUREMENT, MANAGEMENT, AND IMPROVEMENT IN MEDICAL EDUCATION

As previously stated, new approaches in medical education are calling for personalizing and individualizing the learning experience. Students who engage in self-regulated learning (SRL) processes are more likely to be successful. “SRL is a cyclical process with key components of goal setting, strategy selection, self-monitoring, reflection and adaptive change” (Patel et al., 2015, p. 418). By their very nature, ILPs are a SRL tool, requiring goal setting, self-monitoring, and adaptive change. Individualized learning plans are not widely used in undergraduate medical education and therefore the purpose of this study is to examine how they are used in a PPB program. The use of an ILP begins with individual self-assessment.

“Self-assessment is a complicated, multi-faceted, multipurpose phenomenon that involves several interacting cognitive processes. It functions as a monitor, mentor, and a motivator through processes such as evaluation, inference, and prediction.” (Eva & Regehr, 2005, p. S47). As applied

to medical education, self-assessment is a set of regulatory strategies that involves both self-efficacy, the belief in one's capabilities coupled with self-concept, the judgement of one's self-worth (motivator), the mental control and supervision of both cognitive and metacognitive information processes (monitor), and the deliberate practice of specific tasks assigned by qualified teachers (mentor) (Eva & Regehr, 2005). Individualized learning plans support this cyclical process of monitoring, mentoring, and motivating through: 1) goal setting; 2) identifying strategies and resources necessary to complete tasks related to goals; 3) gathering evidence of activities related to completed tasks; 4) using evidence to adjust performance, and; 5) submitting ILP for review. This continuous process of feedback, change, and assessment is the very nature of performance measurement, management, and improvement.

SUMMARY

This chapter provided the literature supporting the exploration and need for ILPs in pre-medical post baccalaureate programs. The ILP is a professional development tool for physicians. The use of the tool and the mental exercises it encourages work best when introduced earlier in the educational process to increase the effectiveness of its use in the professional realm. The post baccalaureate stage of education provides an earlier stage to adapt and adopt.

CHAPTER 3 METHOD

This study examined the implementation and use of an ILP in a pre-medical post baccalaureate program at a Midwestern University School of Medicine. The theoretical basis of ILPs comes from grounded theory, adult learning theory, and continuous performance improvement through performance monitoring and tracking. The previous chapter reviewed the related pertinent literature and research. This chapter described the research methodology.

OVERVIEW

This chapter presented the research methods for this study to include the description of the design, research questions, settings and participants, instruments, procedures and data processing and analysis. Finally, the Institution Review Board Application was discussed.

DESIGN OF STUDY

Mixed method design is a commonly used research method that incorporates both quantitative and qualitative analysis of phenomena. The combining of mixed methods allows for a description of those phenomena to have both breadth and depth. Specifically, the use of mixed methods serves the following evaluative purposes: triangulation, complementarity, development, initiation, and expansion (Greene, Caracelli, and Graham, 1989). Additionally, "neither type of method is inherently linked to any particular inquiry paradigm" (Greene et al., 1989, p. 256.)

This study examined both the process and outcome of ILP implementation and use, making a mixed method design advantageous. Data collected was quantitative through the use of surveys and LASSI pre- and post-tests and qualitative via content reviews of ILPs and open-ended questions asked during monthly interviews. The use of an embedded design (Creswell & Plano Clark, 2011) was employed to answer research questions.

Mixed methodologies also allowed for the examination of paradigmatic intersections as well as synergy between theory and practice. Accordingly, each research question required its own method. This study also explored multiple participants' meanings of ILP implementation and use and employed qualitative methods to collect data. The results of ILP implementation and use required quantitative data and examined ILP implementation from a pragmatic point of view. The use of goal setting and progress monitoring in medical education required qualitative methodology.

POPULATION AND SAMPLE

The Midwestern School of Medicine pre-medical post baccalaureate program is a structured, formal, year-long academic record enhancer program targeting students who have "a longer distance travelled" to medical school because they are educationally and/or economically disadvantaged and the first in their family to obtain a college degree. Students enroll in a prescribed sequence of courses taught by Midwestern School of Medicine faculty and staff. Students must attend all classes and not work during the program. In exchange, students are given books, supplies, and a support stipend for the duration of the program. To successfully complete the program, students must pass all coursework with a B average or higher.

Students who participate in the Midwestern University School of Medicine pre-medical post baccalaureate program were 1) denied admission to the Midwestern School of Medicine, 2) are residents of the Midwestern state, 3) completed pre-requisite courses in general biology or zoology, general chemistry, organic chemistry, and general physics, 4) have a minimum MCAT score. The program admits 16 students annually on average.

The students enrolled in this cohort range in age from 23-33 with 100% self-reporting to the American Medical College Application Service (AMCAS) that they are disadvantaged, and 100% of those students coming from economically and/or educationally disadvantaged

backgrounds. Program participants were considered first-generation college if the student was raised by parents or guardians who did not attain a 4-year college degree during their formative development. The students in this cohort identified as either gender identity (CIS) male or female and self-reported their ethnic identities as Hispanic or Latino/a, Asian, Caucasian non-Hispanic, African American or Black and biracial. 12 students in this cohort participated in this study.

RESEARCH QUESTIONS

Table 1 on the next page outlined the research questions, variables, data sources, data collection and analysis.

TABLE 1: DATA COLLECTION AND ANALYSIS PLAN

1. How is a sustainable ILP developed?				
Research Question(s)	**Variables**	**Data Source(s)**	**Data Collection**	**Analysis**
What are the challenges to designing, developing, & implementing an ILP for pre-medical post baccalaureate students?	To be determined through analysis.	Archival data (To include by not limited to surveys, assessments, communication between researcher & participant) ILP Researcher Notes	Document review Observation and memo writing	Coding based on grounded theory.
What types of development goals do students in a post baccalaureate program set and how are they used?	Attitudes Skills Behaviors	Archival data Researcher Notes ILP	Observation and memo writing Document review	Statistical analysis of description Coding based on grounded theory
2. What impact did the ILP have on students?				
Research Question(s)	**Variables**	**Data Source(s)**	**Data Collection**	**Analysis**
How does an ILP promote self-assessment, self-directedness, or self-regulated learning?		ILP Monthly meeting Researcher Notes	Document review Interviews Observation and memo writing Survey	Coding by grounded theory & open-ended questions Statistical analysis of description
What impact did it have on their performance?	LASSI scores	ILP Monthly meeting	Document review Interviews	Coding by grounded theory & open-ended questions

	Year 1 Histology grades Year 1 Anatomy grades	Researcher Notes	Observation and memo writing Survey	Statistical analysis of description
3. What are the students' perceptions and attitudes towards ILPs?				
Research Question(s)	**Variables**	**Data Source(s)**	**Data Collection**	**Analysis**
	Attitudes Usefulness Ease of Use Progress	Student	Qualtrics Survey	Statistical analysis of description Statistical analysis of inference Coding for open-ended questions

RESEARCH SETTING

This study was conducted at a public, urban, four-year institution with a large commuter campus located in the Midwestern United States with Carnegie classification of RU/VH (Research Universities, Very High research activity). The institution is accredited by the Higher Learning Commission (HLC) of the North Central Association of Colleges and Schools. The institution's School of Medicine is a large single-site campus and accredited by the Liaison Committee on Medical Education (LCME). The Midwestern School of Medicine has an urban mission to graduate a diverse workforce of scientist and physicians committed to inclusive health care. The School of Medicine has an established academic enhancement pre-medical post baccalaureate program.

DATA COLLECTION

The data for this study included Learning and Study Skills Inventory (LASSI) pre- and post-test scores, multiple monthly ILP submissions, monthly meetings with the researcher, a survey, and a researcher journal. The first phase of data collection included the Learning and Study Skills Inventory (LASSI) and a Previous Educational Experience survey given to the pre-medical post baccalaureate students during orientation. The LASSI is web-based and the results from this assessment were the basis of the Psychology and Technology of Success course. The Previous Educational Experience survey distributed through Qualtrics was used to discover if participants had previous exposure to the LASSI, ILPs, or academic support in high school and college.

The second phase of the data collection was monthly ILP submissions. Using OneNote, each student submitted an ILP electronically on the last Friday of the month. Email reminders went out on the 15th and 25th of each month. In the second month, students began to meet with the researcher one-on-one for three consecutive months to discuss progress on the ILP. During this phase, data collection occurred throughout the process since the researcher journal was used to capture running notes about the iterative process of ILP development. In the final phase, students completed a survey about their experience using ILPs and the LASSI post-test.

INSTRUMENTATION

Previous Educational Experience Survey (Appendix A). This questionnaire was used to collect information on student's previous exposure to academic resources or ILPs in high school and college. This PPB program serves first-generation college students. First- generation college students are often academically underprepared and unaware of the various study and metacognitive skills necessary for academic success. The survey was created to track student's prior use of academic support as well as help-seeking behavior. The survey was piloted on the previous PPB

cohort. The data collected was de-identified and used to build a profile of each PPB cohort. General information about the survey results was shared with the class as a regulating and team building technique. As mentioned in Chapter 2, people are often unaware of what they do not know and how much they do not know in relation to others. Information from the survey was meant to start the conversation about resource utilization, academic support, and help-seeking behaviors.

Learning and Study Skills Inventory (LASSI) 3rd Edition (Appendix B) by Weinstein, Schulte, & Palmer (1987) is a ten-scale, 60-item assessment of student awareness and use of learning and study strategies (Weinstein, Palmer, & Acee, 2015) that has been used internationally and translated in several different languages. Available in both paper and web format, LASSI takes 15-20 minutes to complete and offers a pre- and post-test providing both prescriptive and diagnostic analysis of individual strengths and weaknesses normed against college peers as well as identifying areas to improve beliefs, skills, knowledge, and attitudes (Weinstein & Palmer, 2002). The LASSI is used to diagnose strengths and weaknesses in learning to learn courses as well as recommend approaches to academic study.

The LASSI has been extensively researched and validated on various student populations ranging from high school through professional school, subpopulations underrepresented minorities (Flowers, Bridges, & Moore, 2011; Flowers, 2010), medical students (Haghani & Sadeghizadeh, 2011), to examine issues such as remediation (Gatto, 2010), self-regulation (Field, Parker, Sawilosky, & Rolands, 2013, and predicting academic outcomes (Cano, 2006; Marrs, Sigler, & Hayes, 2009; Seabi, 2011; West & Sadoski, 2011; Dill, Justice, Minchew, Moran, Wang, & Weed, 2014;). West and Sadoski (2011) also investigated the predictive value of a variety of variables (ten LASSI scales, MCAT scores, and undergraduate GPA) on the first semester GPA of 106 first-year medical students. The authors found that the LASSI scales of Time Management and Self-

Testing were the best predictors of students' final averages (West & Sadoski, 2011). Each scale is valid and reliable (range .762 to .866) and the inventory measures metacognition, affective components, and cognitive strategies. The LASSI was piloted with previous PPB cohort.

Individualized Learning Plan (ILP). The individualized learning plan (Appendix C) is a document that is the combination of two documents. Two questions were adapted from the Midwestern University Graduate School Individual Development Plan (IDP) used to document the annual progress of doctoral and post-doctoral students. Doctoral and post-doctoral students are required to submit IDPs once a year and discuss the contents of the IDP with their advisor. The ILP asked students to report strengths, weaknesses, and opportunities. Individual LASSI scores are also provided. The second and third pages of the ILP are taken from the ILP used by Stuart, Sectish, & Huffman (2005) in a pilot program with pediatric residents. The second page records the students' ISMART goals and outlines the strategies and resources needed to accomplish the goals as well as the evidence of achievement. The last page of the document tracks the progress made on the goals. Permission to use and adapt was granted from the Midwestern Graduate School and Elizabeth Stuart (See Appendix D). Multiple formats of the ILP including paper, electronic, and a shared OneNote of the ILP were available to the students. OneNote was used to make the document readily accessible to both the researcher and student in real time, at any time, throughout the duration of the program.

Monthly Meetings. Students met with the researcher once a month to discuss the progress on the ILPs. Three open-ended questions were discussed each month (see Appendix E). After each discussion, notes were recorded in the researcher journal.

Perceptions, Attitudes, and Progress On ILPs Survey

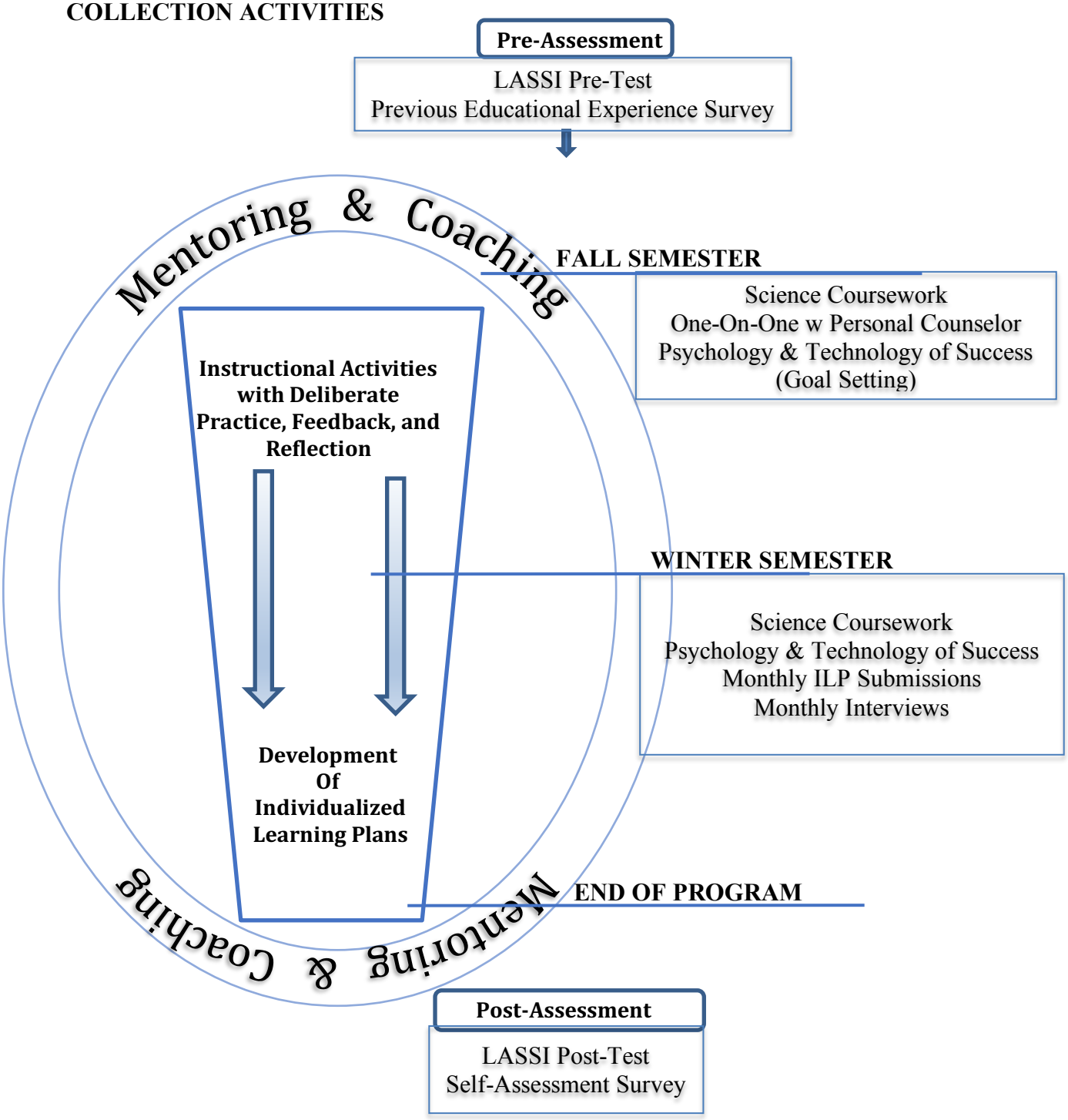
This survey (see Appendix F) is an adaption of two instruments used by researchers exploring ILPs in third year clerkships (Stuart, Sectish, & Huffman, 2005) and in pediatric residency programs (Li, Tancredi, Co, & West, 2010b). The first study examined the perceived benefits and barriers of ILPs using open-ended questions to address problems encountered during the study. The latter study examined residents' self-reported progress on goals as well as attitude towards ILPs using a Likert scale. Additional previously used survey items on perceived usefulness and perceived ease of use were found using the Inter-Nomological Network (INN). Perceived ease of use and perceived usefulness survey items using a Likert scale were also used in the survey (Davis, 1989; Davis, 1993). This survey will be distributed through Qualtrics and available through a secured server with access given only to the PI.

Researcher Journal recorded notes and captured observations throughout the duration of the study. A periodic review of the ILPs was recorded and coded. The journal was used to chronicle additional meetings with students and developmental milestones encountered throughout the study.

PROCEDURE

A review of the Pre-Medical Post Baccalaureate Education Model in Figure 3 is used to explain the procedure. The PPB program is a yearlong program of academic coursework that includes courses in science, career exploration, and skill development. Students are given a number of computer-based assessments including the LASSI and Previous Educational Experience Survey during orientation. The Previous Educational Experience Survey was distributed through the Qualtrics web portal purchased by the Midwestern University. This system allows researchers to design surveys and questionnaires and collect, track, and view respondent's results. This system was used to present required Institutional Review Board (IRB) approved consent.

FIGURE 3 PRE-MEDICAL POST BACCALAUREATE EDUCATION MODEL & DATA COLLECTION ACTIVITIES



The LASSI is a web-based inventory that provided the results of the assessment directly to the students. LASSI results were accessible through a password and user id sent to each student with the program director as the account administrator and access to the results. The results were used to develop a profile of each cohort, an individual student profile, and update the topics and lectures for the Psychology and Technology of Success course.

Fall course work included Medical Terminology, Biochemistry, Embryology, Post Baccalaureate Seminar and the Psychology and Technology of Success with the learning specialist. Various guest speakers and lectures were scheduled to talk about CV development, financial aid, stress management, medical specialties, health disparities, and making career choices. Students were required to see the personal counselor once a month. Midway through the first semester, students were assigned clinical mentors they shadowed for the remainder of the academic year. The assignments and activities all the Fall courses were designed to be challenging, introspective, and a reflection of the first year of medical school. Courses were taught by medical school faculty and staff. The program increased in time commitment, intensity, and challenge during the first semester in preparation for the rigor of the second semester.

During the Winter semester, students took Psychology and Technology of Success with the personal counselor, Physiology, Histology, and Anatomy. Students met one-on-on with the learning specialist (who was also the researcher) once a month. They continued shadowing physicians in the hospital and had a set of lectures and speakers scheduled throughout the semester. At the start of the second semester, students developed at least three (3) personal, academic, and/or professional related program goals using the ISMART (important, specific, measureable, accountable, relevant, and time-bound) strategies (Li et al., 2010b). Each month, students

submitted a progress report on their ILP from January to May using OneNote. The ILPs were monitored by the researcher. Submissions were due on the last Friday of every month.

Brief interviews no longer than thirty minutes were conducted winter term. Consent was given prior to the start of each session. Students received a copy of the consent form. Hand written notes were taken during each session. Students discussed the barriers and strategies to completing the ILP process every month. The researcher summarized interview notes with each participant to check for accuracy and probe for more detail. While interviews were conducted the entire semester, only three months of data was collected and analyzed for this study.

OneNote is part of the Office 360 application that is free and available to all students at the Midwestern University. A digital notebook, OneNote allows for collaboration, information gathering, and curating. This application allowed the researcher to read, comment, and probe for additional information on the ILP. Students were able to add additional pieces of evidence or work product into the notebook. The application worked well with other Office products. Students had the use of an iPad mini for the duration of the program and had explored many apps throughout the program. Using OneNote allowed for a standard electronic ILP format that was mobile, accessible, and available in real time.

DATA COLLECTION

Data collected from the researcher's journal, ILP submissions, monthly interviews with the students, and the final survey provided information for this study. Students submitted ILPs electronically each month. Each student's final ILP was reviewed and compared to the monthly interview log. The monthly interviews asked two open-ended questions: what are the barriers to completing the ILPs and what are the strategies used to complete the ILPs. The lasts interview asked what could be done differently. Memos were written regularly to consolidate researcher

notes and ideas. The final survey asked both open-ended questions and Likert scale questions about the impact, challenges, ease of use, perceived usefulness, and attitudes about ILPs based on previous research conducted by Li et al. (2009 & 2010a). The data was collected, organized chronologically, and reviewed for themes and patterns, and coded. Data was reorganized according to themes and compared against researcher notes. Likert scale data strongly agree and agree were collapsed into one agree category. Similarly, strongly disagree and disagree was collapsed into one disagree category.

Answers to open-ended questions on the survey and monthly interviews were analyzed in an iterative cycle of organization, categorization, and generalization. Monthly participant responses were put into tables according to the month the responses were recorded: 1, 2, or 3. Additionally, each respondent had a coded file so that participant responses were reviewed as 11 individual units. A total of 14 tables were analyzed (11 students and 3 monthly compilations).

Responses to barriers and strategies to completing the ILPs were itemized per respondent and tabulated per month. Any response that occurred more than once was included in the analysis. Participant responses were analyzed across months. When the same participant used the same word in two separate months, it became a theme. If two participants used the same language in the same month, it became a theme. Generalization occurred when similar responses were reorganized into broader categories. Raw data was shared with an external reviewer to check for consistency and thoroughness. All discrepancies were resolved through discussion between external reviewer and researcher.

DATA ANALYSIS

Quantitative data analysis includes simple descriptive statistics of the Previous Experience Survey, LASSI, ILP submissions, and Self-Assessment Survey. Qualitative data analysis includes

a step-by-step iterative process of analysis, organization, and coding of research journals and the ILPs. The ILPs were reviewed as a group during each monthly submission and in individual de-identified student sets. Upon the initial review of ILPs, the researcher wrote an entry into the researcher journal detailing the initial impressions of the review. From this initial review, codes or themes were established. The ILPs was then reorganized into sets with common themes for another review to see if any relationships can be drawn between the categories. The purpose of this exercise was to discover patterns of thoughts or behaviors. This inductive method allowed for meaning to be realized through thorough analysis. Strauss and Corbin (1990) suggest *in vivo coding* using actual word phrases used by the participants.

To ensure the data captured in the researcher journal allowed the researcher to meet the research objectives, the research questions were used as an organizing framework for journal entries.

INTERNAL AND EXTERNAL VALIDITY

Mixed methods research was a synthesis of multiple perspectives and viewpoints using more than one method of data collection (Johnson, Onwuegbuzie, & Turner, 2007). Using multiple methods was a validation strategy as well as a triangulation strategy to ensure the variance in results came from the phenomena being studied and not the particular methodology used (Jick, 1979).

This study used a qualitative mixed method approach because it sought to understand the process and production of ILP development in a pre-medical post baccalaureate program. Qualitative research sought understanding through naturalistic approaches. Students in this program have similar lived experiences and more importantly, an identified need for academic enrichment to get into medical school. The participants acted as informants in this study (Mays &

Pope, 1995). The data collection required active involvement of the researcher. The nature of qualitative research made validation more significant than reliability (Golafshani, 2003). Validity was secured through triangulation, the deliberate use of wide ranging sources of information, usually through different means of collection (Mays & Pope, 1995). Johnson et al., (2007) recommends triangulation between qualitative and quantitative methods to cancel the bias that was inherent in any one method or data source.

Triangulation helped to develop a comprehensive picture of phenomena because its aim was to verify findings, integrate or synthesize theoretical constructs, and improve the accuracy of interpretations. Moreover, triangulation increased confidence in results and leads to the creation of new methods as well as the discovery of aberrant or unexpected elements of phenomena (Jick, 1979). This study used sequential triangulation by taking the pre-assessment results in the first phase of the data collection to plan for the development of the ILPs that occurred in the second phase.

IRB

The proposal will be submitted to WSU SSIRB with a request for an expedited review.

LIMITATIONS

Qualitative research was time-consuming and often required that the researcher take an active role in the data gathering. Thus, the proposed PPB program was a practical and convenient selection sample. Limitations included potential investigator bias and limited ability to generalize findings to other populations. Duplication of qualitative designs presented challenges in interpreting results.

Delimitations included using one post baccalaureate program the directly admits graduates from its program into the Midwestern School of Medicine in the study. Doing so represented a practical choice in the design process and allows for future continued study.

SUMMARY

This chapter presented the research methodology for a mixed method design studying the phenomena of ILP development and implementation. A pre-medical post baccalaureate program at a Midwestern university was the population sample. Grounded theory was used to analyze the data.

CHAPTER 4 RESULTS

The purpose of this research study was to use grounded theory and performance measurement, management, and improvement to better describe and understand the development and use of individualized learning plans (ILPs) in a pre-medical post baccalaureate (PPB) program. Students in a pre-medical post baccalaureate program used an ILP to track and monitor important, specific, measureable, accountable, realistic, and time-bound (ISMART) goals they created. This study looked at the use of ILPs as both a process and an outcome and asked the following questions:

1. How is a sustainable ILP developed?
    a. What are the challenges to designing, developing, and implementing an ILP for pre-medical post baccalaureate students?
    b. What types of goals do students in a pre-medical post baccalaureate program develop and how are they used to enhance their development?
2. What impact does an ILP have on students?
    a. How does an ILP promote self-assessment, self-directedness, or self-regulated learning?
    b. What impact does an ILP have on student academic performance?
3. What are students' attitudes towards individualized learning plans (ILP)?

PARTICIPANT DEMOGRAPHICS

A convenience sample of eleven participants, nine female students and two male students, ages 22-33 participated in a PPB program in the School of Medicine in the Midwest United States. To be eligible to participate in the program, students must: be a resident in the state; be the first in their family to graduate from college; come from low income households; meet a minimum MCAT

score; completed their undergraduate degree by June of the year they want to enter the program and; completed the eight course pre-requisites in chemistry, biochemistry, math, and physics. Eight of the eleven students attended in-state universities. Two of the eleven students possessed graduate degrees.

During orientation, students completed assessments including the Previous Educational Experience survey (APPENDIX A) and the Learning and Study Skills Inventory (LASSI). Information from the assessments helped build individual student profiles, a cohort profile, and informed programming and instruction over the academic year. The Previous Educational Experience survey gathered information on students' previous academic successes, challenges, use of academic resources, and previous use of an ILP in high school and college. Seven out of eleven of the students had completed the LASSI before. Nine of the eleven of the students had used academic support services in college. Eight students received tutoring in math, chemistry, and physics. Seven students provided tutoring in biology, math, chemistry, and physics. Four of the eleven students had participated in study table or study hall. Eight of the eleven of the students reported using an individualized plan to complete course work. When asked to specify the type of plan, five students reported using the following type of individualized plans: learning contract (1); individualized educational plan (IEP) (1) and; individualized learning plan (ILP) (3).

The LASSI is a ten-scale, 60-item assessment of student awareness and use of learning and study strategies. When aggregated, the inventory measures self-regulation *Drive* (Use of Academic Resources, Time Management, Self-Testing, and Concentration); *Will* (Motivation, Attitude, and Anxiety) and; *Skill* (Information Processing, Selecting the Main Idea, and Test Strategies). The pre-test was given during the orientation and the post test was given at the end of the program. Table 2 shows the average percentages of pre- and posts-test results. Because the sample size is so

small, averages are shown to protect the anonymity of the participants. Scores below 75% represent areas needing development. The lowest pre-test percentages were in Selecting the Main Idea (SMI) (46%), Anxiety (ANX) (53%), Test Strategies (TST) (54%) Self Testing (SFT) (58%). Motivation (MOT) was the highest scale (74%) followed by Time Management (TMT) (71%). Skill (55%) was the lowest of the three component measures. Drive (66%) was the highest.

Post-test percentages showed improvement in all scales except one, Use of Academic Resources (UAR). Selecting The Main Idea had the largest gain (28%) followed by Anxiety (27%), Attitude (25%) and Self-Testing (25%). All averages increased above 75% with the exception of UAR. The average for Skill increased by 20%, Will increased by 18% and Self-Regulation by 4%.

TABLE 2: MEAN LASSI PRE- AND POST-TEST COMPARISON

	ANXIETY (ANX)	ATTITUDE (ATT)	CONCENTRATION (CON)	INFORMATION PROCESSING (INP)	MOTIVATION (MOT)	SELECTING MAIN IDEA (SMI)	SELF TESTING (SFT)	TEST STRATEGIES (TST)	TIME MANAGEMENT (TMT)	USE OF ACADEMIC RESOURCES (UAR)		Skill (INP, SMI, TST)	Will (MOT, ATT, ANX)	Self-Regulation (UAR, TMT, SFT, CON)
Pre	53	63	65	64	74	**46**	58	54	**71**	69		**55**	64	**66**
Post	80	**88**	81	75	78	74	72	77	77	**69**		75	**82**	75
Δ	27	25	16	9	4	**28**	25	23	6	**0**		**20**	18	**4**

All eleven students took the following courses during the first semester: MCAT Critical Analytical Reasoning Skills (CARS), Psychology and Technology of Success, Post Baccalaureate Seminar, Embryology, and Biochemistry. During the second all eleven students semester, students

took: Psychology and Technology of Success, Anatomy, Histology, MCAT self-study prep, and Physiology.

Psychology and Technology of Success was taught over two semesters. The first semester course was taught by the learning specialist and focused on physician shadowing, metacognition, study skills, and goal-setting. In addition, students met one-on-one monthly with the personal counselor. During the second semester, the personal counselor taught the course and focused on professional identity, career development, and service learning. Students used an ILP during the second semester to track, monitor, and evaluate goals. During that time, students met one-on-one with the learning specialist monthly. Figure 3 in Chapter 3 described the educational activities of the program.

MODEL FOR SUSTAINABLE ILP DEVELOPMENT

Figure 4 outlines the participants' responses to the open-ended questions about the challenges of ILP implementation and problems encountered during the process.

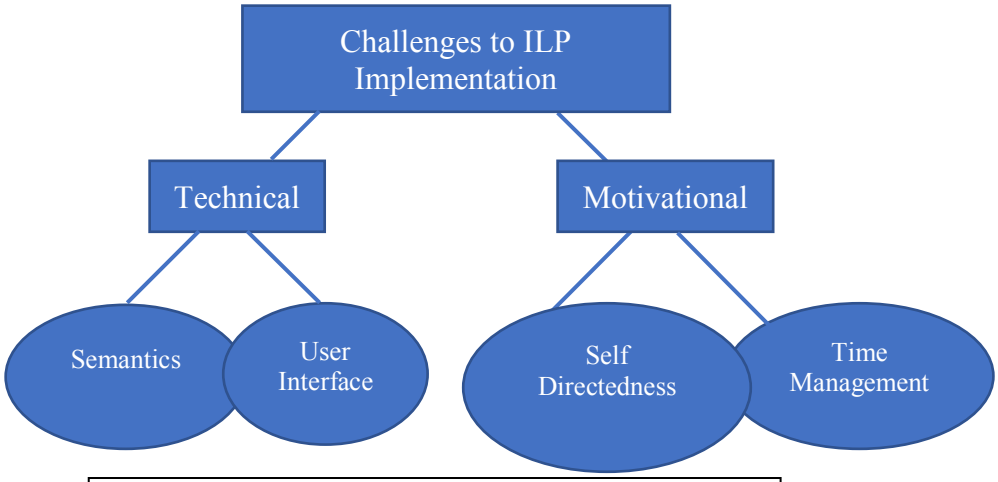


Figure 4: Challenges to ILP Implementation

Two broad categories emerged from the challenges in ILP implementation: technical and motivational. The former is related to the mechanics of creating and completing an ILP where the latter is related to the participants' motives. The technical challenges were separated into two categories. Semantics refers to challenges creating ISMART goals and the subsequent tracking, monitoring, evaluating, and gathering evidence. User interface refers to challenges interacting with the OneNote application or the ILP. Technical challenges needed to be teased out into two separate categories because semantics referred to the student's technical ability to complete the ILP. User interface referred to the technical abilities and challenges students had with the OneNote application.

User interface challenges included syncing the document between devices or email accounts, having access to the Internet, and having email access. Students may have updated different versions of the ILP switching between their med.edu account and their access ID during the first month. While intermittent access to the Internet may occasionally occur, during two separate incidences of the study, Internet access was so incapacitated, new cable installation occurred in the SOM building. One student reported that for the duration of the study, they were unable to access the document on the iPad but able to access it on the laptop.

> "I did not like the OneNote interface. It is difficult to use at times. It freezes up and you have to go back and forth between the tabs. I could never get the app to work on my mobile devices (iPad and iPhone). It also wouldn't recognize my school email account."

OneNote is a web-based application available through Microsoft Office 360. It functions as a virtual notebook. Students had previous exposure to OneNote during the first semester through notetaking and goal setting exercises. The original ILP was created in the desktop version of OneNote and sent via email to students med.edu accounts. In addition to Internet access issues,

students reported intermittent access to email accounts and the application freezing. Another student called the application annoying as they did not know how to use it at first. One of the open-ended responses noted "The user interface is annoying to use. Perhaps a different application would be better than OneNote." While paper versions of the ILP were made available, no student used the paper version for this study. No one asked for additional help with OneNote.

There are three stages to completing the ILP: goal generation, strategic planning, and evidence gathering. Respondents reported challenges in all three areas. Writing ISMART goals was difficult and required constant revisions. This difficulty was observed during the first semester when students were given examples and opportunities to draft and revise goals. At the start of the second semester, students had an opportunity to revisit goals crafted from the first semester. The notes in the researcher journal indicated Student 1 progress on journal did not change and "they insisted on crafting just two goals because they wanted to make sure that the goals were accomplished."

The researcher observed that the students had difficulty writing specific enough goals to be tracked, particularly during the first month. Identifying the best strategies to complete goals was another challenge listed as a barrier during the second month of interviews. Organizing the evidence in the ILP also presented a challenge to some students as they were unsure as to where to put it in the three-page document. From the open-ended section of the survey, participants' responses include: "It was difficult to post the evidence in an organized matter." "Understanding what was needed for the ILP and putting in the time to fill out all the categories."

There was overlap in these two categories as there may be some influence between the two challenges. A challenge in one area could have had an influence on each other. A student

repeatedly having issues with access, may be influenced by not getting the work done. Limited Internet access was a frustration and barrier to completing the task of ILP.

MOTIVATION

Motivational challenges included the personal obstacles participants experienced while completing the ILP. Motivational challenges were also broken down into two categories: time management and self-directedness. Time management refers to scheduling, time allotment on task, and deadline-related activities or behaviors. Students received two monthly email reminders that the ILP was due on the last Friday of every month. That reminder was sent on the 15th and 25th before the due date. At the time of their individual monthly interviews, students had not always updated their ILP to review in situ with the researcher. During the first month, six of eleven students completed the ILP by the deadline and one did not complete it at all. During the second month seven students completed the ILP by the deadline. During the last month, nine of eleven students completed the ILPs on time.

Respondents reported needing to set aside time to update the ILP as well as difficulty securing the time to complete the task. Another respondent had difficulty incorporating studies with completing the ILP. Four students suggested a calendar embedded in the ILP. The calendar would serve as an assignment tracker, real time scheduler, and reminder. Suggestions for improvements include: "if possible having a calendar as a timetable could help track assignments and the exam schedule in real time."

Self-directedness refers to all other individual behavioral challenges to completing the ILP. During the monthly meetings, students would talk about new goals and new strategies they generated but failed to write down on the ILP. According to the researcher journal, students had to be reminded to add new goals and strategies to the ILP during each month of the interviews.

Another respondent indicated difficulty in adapting to the change in schedule and educational activities. The need to regularly follow up on the ILP was also noted. Students reported motivational challenges to complete the ILP. “I encountered a lack of motivation to actually do the ILP at times. Sometimes it seemed like busy work.” Another respondent suggested a dashboard so that an analysis of time on task or progress toward goal can be visualized. “A statistical option to see your progress. Such as StudyBlue has.” During the first month, Student 4 suggested:

> “spreadsheets that converts or graphs the study time to see if you are using your time wisely. Visual dashboard would be helpful to see what was done the previous weeks to chart your progress.”

Four students were unsure as to where to put items in the ILP itself. As observed in the researcher notes, none of the students followed up with an email or in person for clarification on how or where to add items on the ILP. This challenge was placed in both semantics and self-directed categories. Despite discussing this in class during the first semester, some students could not remember or it did not seem obvious where to make changes. Two students created new tabs in the ILP to add evidence of their working out and note taking respectively and discussed with the researcher each month how they used the data to reflect on their progress, adjust their behaviors and reassess priorities. Taking pictures as evidence became a motivator to continue. Two students correctly placed information in the monthly OneNote log during the first month.

During the second month of interviews, three students mentioned discussing goals and their progress on goals with other PPB participants. Students started talking about their progress with their peers in a space not monitored or facilitated by the researcher. The discussion and the successes of others provided motivation for others to continue working on goals. “It felt really good to talk with classmates and to see how they were coming along on their goals. It made me

want to work harder . . . even longer to get to where I needed to be." (Month 2, Student 7). The researcher noted that this behavior was not recorded in the previous PPB cohort who beta-tested the ILPs. Students were also observed working in a more concerted effort after classes including studying, working out, and going out to dinner to celebrate birthdays and decompressing after exams.

BARRIERS & STRATEGIES

Figure 5 shows the relationship between the barriers and strategies to completing ILP students reported every month. Two types of barriers prevented students from completing ILPs: intrinsic and extrinsic barriers. Intrinsic barriers were those obstacles that were reinforced by internal rewards. Most of the barriers reported by students were intrinsic ones. Students encountered lack of confidence, self-doubt, anxiety, motivation, laziness, overthinking, and burnout while completing the ILP. Additional feelings of annoyance and frustration with tasks taking longer than expected also occurred. Students reported unrealistic expectations (4), overly ambitious goals (2), competing interests (4), distractions (3), and continuing bad habits (3) as additional barriers.

Time management presented challenges to students as scheduling conflicts, improper allotment of time on task, having too much time, and being off sync were reported in monthly interviews. Two students had health concerns that required multiple visits to the doctor and took them away from school and studies.

Extrinsic barriers are those obstacles controlled by external sources. Lack of knowledge, "not knowing the mistakes made on the exam" and the academic schedule were the only extrinsic barriers students reported during the monthly interviews. As noted in the researcher journal, no post exam reviews were available for PPB participants. Therefore, students were unaware of

mistakes made and information gaps in the completed courses. Students took two courses at a time with the schedule changing every eight weeks except for a month dedicated to MCAT preparation. As mentioned earlier, Internet malfunctions caused some workflow disruptions.

Strategies to overcome barriers were generated by the creation of the ILP, the monitoring process, and monthly meetings throughout the second semester. Students employed both cognitive and cognitive/behavioral strategies to overcome barriers. Students reported using the following cognitive strategies: thinking, feeling, reflecting, visualizing, prioritizing, and evaluating. Cognitive/behavioral strategies are ones in which the students make conscious decisions to act. These strategies included downloading app to use as reminders, coaches, or automating actions. Additional strategies included rewriting tasks list or goals, taking breaks, forming study groups, changing study locations, changing the order of study activities, and following a planner.

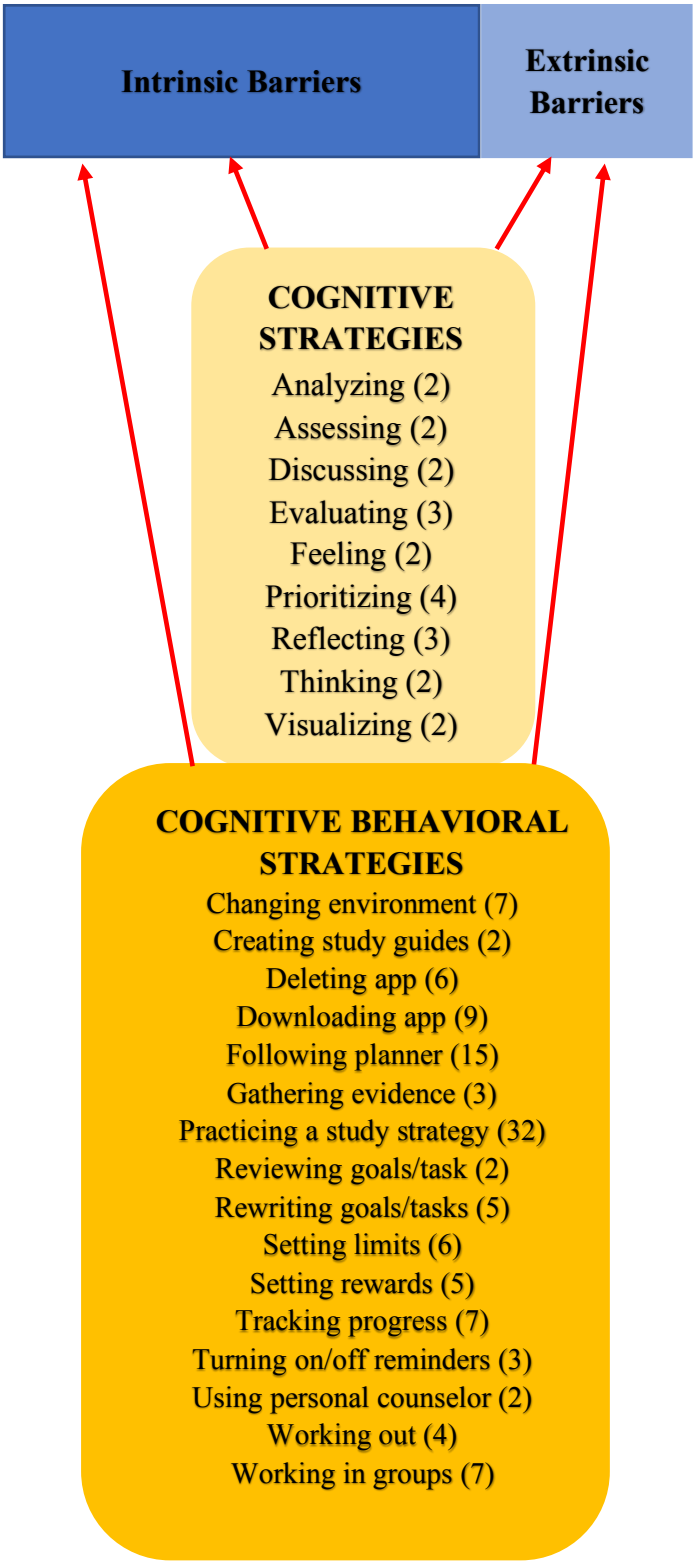
At the start of the study, students recognized the need for time management: to plan, record, and follow tasks on paper. Every participant had purchased a paper planner and actively using it during their first meeting. Each student expressed the need to have one in their interviews during the first month of the study. This behavior set this PPB cohort apart from all previous PPB cohorts. Six students downloaded or deleted apps to support progress on goals, specifically for fitness, timers, money management, reminders, and autopay. Students also created a group text account to stay connected. The apps that were deleted were included social media accounts Snapchat and Instagram.

During the second month, students were allocated time, tutors, and instructional space to study for the MCAT. The students reported that they had “too much time” on their hands. Three students had MCAT goals initially written in their ILPs. Two more students created MCAT goals to stay focused during the month. Another student took the time to recharge. In Month 2, Student

1 “I just took the time to read the book I set out to read and get back into myself. I needed a minute to recharge.”

Classes resumed during the third month and students reported being happy to be back in “regular” classes. Eight students had a difficult time transitioning back to a schedule and focusing on studying. Group cohesion began to set in as students developed groups to study as well as work out. Students spent this month reassessing goals, priorities, and interests. Additionally, students were reintegrating hobbies and interests to set incentives and rewards for studying.

FIGURE 5: BARRIERS AND STRATEGIES



TYPES OF GOALS

Students were encouraged to write a minimum of two ISMART goals for three different purposes: academic, professional, and personal. Academic goals were goals related to the development of specific academic skills or completing coursework. All goals that used the terminology from the LASSI were coded as academic. Time management skills (8/11) was the most frequently listed goal followed by a generic term "skills" (3/11), MCAT prep (3), test taking (3/11), and anxiety (2/11). In addition, improving reading speed and comprehension (2/11) was also a goal. The PPB program exposed students to the requirements and lifestyle of medical students. With the volume of information to digest, PPB students were concerned with increasing reading speed in an effort to get through course material. During the first month of interviews, Student 1 reported "it takes me such a long time to get through material. I need to be able to read faster."

Professional goals were written about future plans related to specialty exploration, the medical school application process, and career and professional development. The goals generated in this category included: the exploration of medical school co-curricular activities, applying to medical school, restudying Anatomy for high performance once in medical school and, the creation of study guides to be used once in medical school. The last two goals were considered both academic goal (behavior-related) and professional goals (future-oriented) but were counted as academic goals.

Personal goals were those goals that were not academic or professional. The PPB program and the School of Medicine placed heavy emphasis on wellness. Students were encouraged to explore and address outstanding personal issues prior to the start of medical school. Eight out of eleven students listed working out as a goal. A student used jogging as a strategy to cope with

stress. Jogging then became its own goal. Female students wanted to lose weight while a male student wanted to gain weight. Two students chose to incorporate reading the Bible over the academic year. Two students wanted to learn how to better manage their finances. Two students wanted to manage the transition to medical school with their personal relationships. One student was concerned with getting enough sleep as they had erratic sleeping patterns. Finally, one student needed to reduce their use of social media as it distracted them from their studies. While the latter two goals also have to deal with time management, self-care was the primary focus and therefore placed in the personal goal category.

Student created goals that were behavioral or skills related. Nine of eleven students created four goals or more. One student created three goals. One student created two goals. Table 3 outlines the types of goals and the number of goals created by the PPB cohort. Table 4 shows the number and type of goals created per participant.

TABLE 3: TYPES OF GOALS CREATED

Type	**Skills**	**Behavior**	**Total**
Academic	25	2	27
Personal	2	13	15
Professional	2	1	3
Total	29	16	45

TABLE 4: INDIVIDUAL GOAL ALIGNMENT

Student	**Goal**	**Skills**	**Behavior**	**Alignment**	**Type**
Student 1	Time Management Reading	2		LASSI	Academic
Student 2	Time Management Money MGMT Working Out Outreach	2	2	LASSI PPB PPB Individual	Academic Personal Professional
Student 3	TST Time Management Skills Working Out	3	1	LASSI PPB	Academic Personal

Student 4	TST MCAT Subject Review** Working Out	3	1	LASSI PPB	Academic Professional Personal
Student 5	UAR ANX Time Management Work on relationships with the transition to med school	1	3	LASSI	Academic Personal
Student 6	TST ANX Working Out	2	1	LASSI PPB	Academic Personal
Student 7	Time Management SFT INP Skills Sleep**	4	1	LASSI Individual	Academic Personal
Student 8	Time Management Working Out Budget Read Bible	2	2	LASSI PPB PPB Individual	Academic Personal
Student 9	SFT Time Management MCAT Study guides for med school** Working Out Read Bible Relationships outside of med school	4	3	LASSI PPB Individual	Academic Professional Personal
Student 10	Skills Time Management MCAT Working Out	3	1	LASSI PPB	Academic Personal
Student 11	SMI Reading Working Out Reduce use of social media**	3	1	LASSI PPB Individual	Academic Personal

** Goals fit more than one category

IMPACT OF ILPs

A survey with Likert scale and open-ended questions was distributed through Qualtrics at the end of the program. Students reported that the ILPs helped them complete most of their goals. In addition, the ILP helped them complete their most important goals. Table 5 summarizes participants' progress on goals. As previously stated, most of those goals were skills-oriented. Seven of eleven students responded that a significant amount of progress was made on goals. Five students reported some progress made on goals. Seven students completed a significant amount on their most important goal. One student reported fully completing the most important goals.

TABLE 5: PROGRESS TOWARDS GOALS

Progress Towards Goals	**1 No progress**	**2 A little progress**	**3 Some progress**	**4 A significant amount of progress**	**5 All goals were met**
On average, how much progress was made on your goals?			40%	60%	
How much progress was made on the most important goal.		10%	20%	60%	10%

Open-ended questions on the survey asked: in what ways was an individualized learning plan (ILP) helpful; what are the advantages to developing an ILP while in the post baccalaureate program and; what impact has monitoring progress toward your goals had on you? Six of the respondents reported the ILP was helpful in creating goals that resulted in a plan to complete them. The ILP was helpful as a tool that created, organized, planned, and tracked goals. It provided a visual reference for students. ILPs also provided the opportunity to reflect upon work completed as well as work to be done. The ILP as a reference point for generated strategies is another theme that emerged from the responses. Lastly, "the ILP served as a master reminder or to do list."

Advantages to using an ILP in the PPB. Six of the respondents reported that the ILPs gave them the ability to evaluate performance. Four students reported the ability to assess, identify areas

that needed attention. Another four students reported the ILP as essential for tracking progress. The ILP as a source of reflection was a third theme that emerged. One student referred to the ILP "as a journal." Another student saw it as a reference point. Student responses focused on the aspects of self-assessment, self-evaluation, and monitoring through the use of terms such as "accountability" (4), "planning" (5), and "redirecting" (3).

Overall, students reported monitoring had a positive impact on progress. It did so by providing organization to goals. The ILP provided the ability to:

Student *1*	*" Strengthened study skills."*
Student *4*	*" Increase motivation to continue work on goals. "*
Student *5*	*" . . . Encourage independence, self-regulation."*
Student *9*	*" . . . as a reference to strategies reminder "*
Student *10*	*"See what is possible when you stick to a plan."*

ACADEMIC PERFORMANCE

Successful completion of the PPB program required students to maintain a B average or above. While twelve students began the program, eleven students completed the program, and ten students responded to the final survey. It is important to note that not all students have completed the Pre-Medical Post Baccalaureate Program in the last ten years. All eleven students matriculated into medical school the following academic year. Ten students completed the first two courses of Anatomy and Histology. This cohort successfully completed the first two medical school courses in Anatomy and Histology with averages of 78.58 in Anatomy and 81.17 in Histology.

Table 6 shows the averages of the PPB Anatomy course to the PPB Year 1 Anatomy average to the average for the entire Year 1 Anatomy course. This PPB cohort averaged 78.58 compared to 80.96 overall medical school average. Table 7 compares the averages of the PPB

Histology course to the PPB Year 1 Histology average to the average of the entire Year 1 Histology course. The PPB cohort averaged 81.17 compared to the class mean of 83.44. No PPB student failed either Histology or Anatomy.

The lowest performing students in this cohort (<75%) created and monitored two and three goals respectively. The highest performing students (>85%) created and monitored four and seven goals. These two students had written professional goals related to future academic performance. These two students consistently added more details to their ILPs than their peers each month and were prepared to discuss performance during the monthly interview. Moreover, they consistently gathered and uploaded evidence of their progress. Table 8 shows the number of goals, type of goals, and the difference between post baccalaureate and Year 1 course performance.

The student with the greatest change in Anatomy performance (2.24) had the highest Year 1 Anatomy score in the cohort and an academic goal to perform better in medical school. The student with the greatest change in Histology performance (1.19) had the highest Year 1 Histology highest in this cohort and an academic goal to create study guides for use in medical school. The student with the lowest grade in Year 1 Anatomy had a change in grade of 9.50. The same student had the lowest grade in Histology with a decrease in score of 2.10 points.

TABLE 6: PPB ANATOMY PERFORMANCE

PPB Anatomy	MS Year 1 Anatomy PPB Cohort	Overall MS Year 1 Class Mean
82.91	78.58	80.96

TABLE 7: PPB HISTOLOGY PERFORMANCE

PPB Histology	MS Year 1 PPB Cohort Histology	Overall MS Year 1 Class Mean
83.34	81.17	83.44

TABLE 8: PPB ACADEMIC PERFORMANCE CHANGE

PPB Course Average-Year 1 Course Average

Student	# of Goals	Goal Type	Δ Anatomy	Δ Histology
Student 1	2	Academic	-10.06	-4.52
Student 2	4	Academic Personal Professional	-12.08	-0.71
Student 3	4	Academic Personal	-6.03	-5.08
Student 4	4	Academic Professional Personal	2.24	0.11
Student 5	4	Academic	1.38	-3.93
Student 6	3	Academic Personal	-9.50	-2.10
Student 7	4	Academic Personal	-1.07	-8.57
Student 8	4	Academic Professional Personal	-8.16	1.91
Student 9	7	Academic Personal	-0.64	1.38
Student 10	3	Academic Personal	-4.24	0.06

STUDENT'S PERCEPTIONS AND ATTITUDES TOWARDS ILPs

The data in Table 9 presents the findings on attitudes towards ILPs. One hundred percent of the students reported that the ILPs gave them the opportunity to practice areas that needed improvement. Ten students reported the faculty and staff provided support and feedback on goals. Most of the students reported that the ILP provided a system to (a) track progress towards goal (9/10), (b) plan to complete goals and (8/10), (c) document progress towards goal attainment (8/10). Furthermore, the ILP provided alignment with learning needs and goals (7/10). Similarly, seven of eleven students used the ILP to track their progress on goals.

Six of the students agreed that ILPs held them accountable for their achieving their goals. Another six reported that their goals were always changing. Four of the students were neutral on their willingness to invest the time and energy on ILP development. Four students agreed that they had the time to follow an ILP while another four students were neutral about it. There was no consensus on the worthiness of ILP and forty percent neutral on ILPs ability to promote lifelong learning.

TABLE 9: ATTITUDES TOWARDS ILPS

Attitude Towards ILP	**1 Disagree**	**2 Neutral**	**3 Agree**
ILPs are worth the time and effort spent on them.	40%	30%	30%
I am willing to invest the time and energy necessary to develop and implement an effective ILP to improve my performance.	30%	40%	30%
ILPs help me align my learning goals with my learning needs.	30%	10%	60%
ILPs help me plan how to best achieve my learning goals.	20%	10%	70%
ILPs help me document my progress toward achieving my learning goals.	20%	10%	70%
ILPs hold me accountable for achieving my learning goals.	20%	30%	50%
ILPs promote lifelong learning.	30%	40%	30%
I must develop an effective ILP to self-assess, develop goals, develop plans.	20%	30%	50%
I have time to follow through with my learning plan.	20%	40%	40%
I have faculty and staff support to help me follow through with my learning plan by observing me and providing feedback.	10%		90%
It is difficult for me to remember to work on my learning goals on a regular basis.	60%		40%
I have a system to track my progress on achieving my learning goals.	20%		80%
I track my progress on achieving my learning goals.	30%	10%	60%
I have opportunities to practice areas which I need to improve.			100%
My goals are constantly changing.	40%	10%	50%

The data presented in Table 10 denotes the students' perceived ease of use of the ILP. Seven of ten participants found it easy to navigate the ILP. Another seven students agreed that is took little effort to become skillful using the ILP. Six students agreed that (a) it is easy to manipulate the ILP, (b) it took minimal mental effort to complete an, (c) overall easy to use. Four

students did not think the application OneNote was cumbersome to use. Similarly, four students equally agreed or neutral on flexibility and rigidity of the ILP.

TABLE 10: PERCEIVED EASE OF USE

Perceived Ease of Use	**1 Disagree**	**2 Neutral**	**3 Agree**
I find the OneNote ILP cumbersome to use.	40%	30%	30%
Learning to navigate the ILP is easy.	20%	20%	60%
Interacting with the ILP is often frustrating.	30%	50%	20%
I find it easy to get the ILP to do what I want it to do.	30%	20%	50%
The ILP is rigid and inflexible to interact with.	40%	20%	40%
Interacting with the ILP requires minimal mental effort.	40%	10%	50%
I find it takes a lot of effort to become skillful at using the ILP.	60%	30%	10%
Overall, I find the ILP easy to use.	20%	30%	50%

The data in Table 11 illustrates the perceive usefulness of ILPs. Six students reported that ILPs gave: (a) greater control (regulation) over their goals, (2) support as a PPB student, (c) increased productivity and, (d) enhanced individual effectiveness in achieving goals. Four of students reported ILPs enabled them to accomplish more than otherwise possible.

Seven students were neutral on ILPs effectiveness on actual school performance. Six students were neutral that ILP use made accomplishing goals easier. Four students were neutral on ILPs (a) improving the quality of work, (b) enabling goals to be completed faster and, (c) giving greater control over goals. Four students of students did not agree that ILPS allowed them to achieve more goals than otherwise possible or overall useful in accomplishing goals

TABLE 11: PERCEIVED USEFULNESS

Perceived Usefulness	**1 Disagree**	**2 Neutral**	**3 Agree**
Using the ILP improves the quality of work I do.	30%	40%	30%
Using the ILP gives me greater control over my goals.	10%	40%	50%
The ILP enables me to accomplish my goals quicker.	30%	40%	30%
The ILP supports critical aspects of my role as a post baccalaureate student.	30%	20%	50%
Using the ILP increases my productivity.	20%	30%	50%

Using the ILP improves my school performance.	20%	60%	20%
Using the ILP allows me to accomplish more goals than would otherwise be possible.	40%	20%	40%
Using the ILP enhances my effectiveness in achieving my goals.	30%	20%	50%
Using the ILP makes is easier to accomplish my goals.	30%	50%	20%
Overall, I find the ILP useful in accomplishing goals.	40%	30%	30%

SUMMARY

This chapter presented the results on a study that examined the implementation of ILPS in a pre-medical post baccalaureate program. The study examined ILP sustainability, impact on student performance, and students' perception and attitudes towards ILP. The next chapter discusses results.

CHAPTER 5 DISCUSSION

This study examined the use of individualized learning plans (ILPs) as both a process and outcome of a pre-medical post baccalaureate (PPB) program through the lens of grounded theory and performance, measurement, management, and improvement. Students in a PPB program used an ILP to track and monitor important, specific, measureable, accountable, realistic, and time-bound (ISMART) goals they created for academic, professional, and personal purposes. The study asked the following questions:

1. How is a sustainable ILP developed?
    a. What are the challenges to designing, developing, and implementing an ILP for pre-medical post baccalaureate students?
    b. What types of goals do students in a pre-medical post baccalaureate program develop and how are they used to enhance their development?
2. What impact does an ILP have on students?
    a. How does an ILP promote self-assessment, self-directedness, or self-regulated learning?
    b. What impact does an ILP have on student academic performance?
3. What are students' attitudes towards individualized learning plans (ILP)?

ILPs have been integrated into pediatric residencies across the country starting in 2007. Li et al. examined the use of ILPs in pediatric residency programs to: gauge resident and faculty attitudes towards self-assessment and self-directed learning (2009); examined the relationship between goal type and progress on goal (2011); and developed a conceptual model for self-directed learning (2010b). Future research recommended examining a "model for lifelong learning in other

areas of medicine and at different levels of medical education and explore the impact of learner and program level strategies to overcome barriers" (Li et al., 2010b p. 1236).

As other medical specialties are adopting ILPs, maintenance of certification (MOC) programs use an ILP to assist physicians with maintaining diagnostic skills and licensure. Graduate programs receiving NIH/NSF funding require students to annually complete individualized development plans (IDP) to monitor progress toward degree, participation in professional development activities, and career advancement. This IDP practice has been adopted by the Graduate School at the Midwestern University where this study was conducted. The ILP used in this study is the product of two documents: the IDP from the Midwestern University Graduate School and the ILP used in a pilot study conducted by Stuart, Sectish, & Huffman (2005).

Very little research exists on the use of ILPs in undergraduate medical education in the United States. The ILP has five components: 1) self-assessment of strengths and weaknesses as well as a reflection on career goals; 2) generations of goals; 3) a plan to achieve goals; 4) assessment of progress towards goals and; 5) goal revision or plan based on the assessment (Li & Burke, 2010c). ILPs provide the opportunity to develop and monitor goals. Progress monitoring is an effective self-regulation strategy.

ILPs provided value added when they were “rooted in a performance measurement system that continuously feeds decision making” (Guerra-López & Hutchinson, p. 159, 2013). Students assessing their progress on goals with support and feedback from faculty and staff is performance measurement at the operational or individual level. Student performance on these goals were shaped by an environment that is adaptive and responsive to data that informs the effectiveness of each student’s performance. The use of ILPs in a pre-medical post baccalaureate program is both

a process and product of "performers and decision makers about what variables or performance to improve" (p. 165).

SUSTAINABILITY

Eleven students created and tracked personal, academic, and professional goals using an ILP. Those goals were documented in OneNote and progress discussed monthly with the researcher who was also the learning specialist for the program. Email reminders to update ILPs were sent via email on the 15th and 25th of each month. Students reported in monthly interviews that they needed to find the time in their schedule to update their ILPs and often had not completed the ILP in time for the meeting. It was during the monthly meetings that a student discovered that a new goal or new strategies had been generated. Students who created new goals had to be constantly reminded to add the goal as part of the update their ILPs throughout the duration of the study. While the coaching component of the study provided external accountability, as with other studies, many factors impacted ILP implementation.

Students were challenged with accountability, lack of follow up, and lack of follow through during the study. Students downloaded apps to supplement internal accountability such as notifications, reminders, and timers. Two students deleted social media applications so that they were not distracted from their studies. In the second month of the study, students reported discussing their goals and progress with other PPB classmates. Discussion among peers was an organic outcome that was not facilitated or prompted by the program. This outcome is important as "external accountability can be ensured by communicating with team members about their goals" (Lockspeiser, Li, Burke, Rosenberg, Dunbar, Gifford, Gorman, Mahan, McKenna, Reed, Schwarz, Harris, & Hanson, 2016 p. 843). Without knowing it, students developed collective

accountability. Students reported hearing others talk about completing task towards or meeting their goals encouraged them to continue work on their own goals.

In this study, the barriers to completing ILPs were related to creating and completing the ILP process. These barriers fell into two categories: technical and motivational. Technical barriers refer to the technical aspects of creating the ILP through technology and by the students' cognitive processes. Motivational barriers refer to the creator's (student, program, school) motives and constraints. Technical barriers fell into two categories: semantics and user interface. User interface issues were those challenges that had to deal with completing the ILP using the OneNote application. Issues with the Internet and email access stopped student workflow and caused frustration and confusion. The semantic barriers were the challenges of creating trackable goals, the mechanics around how to update the ILP, and adding evidence. Students had challenges with all three stages of the ILP: goal generation, strategic planning, and evidence gathering. In studies on residents in pediatric programs, Li et al. reported residents had "insufficient understanding of how to construct effective ILP (2009, p. 6).

Motivational challenges refer to individual participant's intent or motives and fell into two categories: time management and self-directedness. Time management was a consistent recurring theme throughout this study and included scheduling, balancing tasks, and prioritizing activities. Self-directedness refers to individual control or initiative during in the ILP process and included procrastination, anxiety, lack of interest, and lack of confidence. Similarly, residents were challenged to "finding adequate time and motivation to really focus on ILPs. Faculty also commented some residents lacked organization and follow through needed to develop motivation and desire to make changes" (Li et al., 2009, pg. 6). The lack of time and skill were reported as significant barriers for residents completing ILPs. "Insufficient time was a barrier for both

residents and faculty" (Stuart, Sectish, & Huffman, 2005, p. 299). "Timing is a central factor that has largely been neglected by most learning goal programs." (Larsen et al., 2017, pg. 98). Organization and individual effort is needed to support student personal and professional development (Teunissen & Bok, 2013).

Students generated 29 skills-related goals and 16 behavior-related goals. These goals aligned with the students' academic, personal, and professional interests. The least amount of goals created and tracked by a student were two while seven goals was the highest number tracked. Seven students created and tracked four goals. Three and five goals were created and tracked by two other participants respectively. Three students created professional goals. Two of those students were the top performers in their PPB cohort and the Year 1 Anatomy and Histology courses. These two students provided evidence of progress on goals each month. They also used evidence gathering as motivation. Six of ten students reported that the ILP helped them complete a significant amount of progress on their goals. Four of ten students reported completing some progress on goals. Achievement of goals was dependent of type of learning goals. "More progress is made on goals related to everyday duties and tasks" (Li et al., 2011, p. 1296).

The open-ended responses from the final survey showed that students believed the ILP helped create a plan to accomplish goals and provided a master to do list. The advantage of using an ILP in the post baccalaureate program specifically gave students the ability to evaluate performance, identify areas that needed attention, and track progress on goals. Overall, students reported the act of monitoring as a positive impact on their progress. Having a system to track achievement was the most significant factor with greater progress on goals and the most significant factor found in the research conducted by Li et al., 2011.

IMPACT

The impact of ILP use can be observed through student behavior and initiative in the goal setting process and academic performance. During the first month of the study, 100% of the students purchased planners and were using them to stay on track with coursework. This behavior was not observed in the beta cohort tested in the previous academic year or in previous PPB cohorts. Students downloaded apps on their electronic devices for notification and tracking purposes. Specifically, students used apps to remind them to pay bills, move on to the next task, manage spending, and track diet and exercise. The use of these apps increased student accountability. This behavior was not observed in the beta cohort or other previous PPB cohorts.

Students did not make a significant connection between the ILP and progress towards school work. Specifically, students needed to see themselves as capable of managing their own learning. No student came on their own outside of the monthly meetings for help with their ILP. Students in this cohort did not initiate contact with the learning specialist after exam results. Furthermore, when students got in academic difficulty, they did not refer to the ILP. Students in the program were not used to managing, monitoring, or assessing their own learning.

One of the program requirements was taking the MCAT again. However, only five students ended up creating a goal for retaking MCAT. During the month designated for MCAT prep, three students had MCAT goals while two students created new MCAT-related goals in that month. During this month, students reported that they did not like having "free time", time not scheduled for classroom learning. And yet, in the third month, students had challenges returning to regularly scheduled classes. Students did not refer to or mention their planners after the first month. They did however talk about "reorganizing tasks", "revisiting to do lists", and "prioritizing" as strategies to completing the ILP during monthly meetings.

While all students were able to follow their goals and use specific strategies to achieve them, the second half of self-regulation, sustained optimization of learning, was a challenge for the students to maintain from month to month. Students knew what they needed to do, often they knew how to do it. What was lacking was the execution of the task. "ILPs in undergraduate medical education improves SDL strategies among students" (Chitkara, Satnick, Lu, Fleit, Go, & Chandran, p. 4, 2016). However, "evidence for the effectiveness of SDL over traditional educational method is still lacking" (Northnagle et al., 2010, p. 1878). SDL skills are teachable but they require practice.

At the end of the academic year, all averages on the LASSI post-test increased and above the satisfactory range of 75% except for the of Using Academic Resources (UAR). The academic subcomponents of Skill, Will, and Drive also increased. The largest gain in score was Skill (the combination of Information Processing, Selecting the Main Idea and Test Strategies) while the smallest gain in score was Self-Regulation (the combination of Using Academic Resources, Time Management, Self-Testing, and Concentration).

Eleven students participated in the study and matriculated into medical school the following year. Ten students completed the first set of courses Anatomy and Histology. This combination of courses traditionally tax students as it represents the transition to medical school, the necessity to pay attention to detail, and the enormous strain these visual courses has on the memory. "10-15% in each year's entrants to medical school will encounter academic failure at some stage in their programme" (Holland, 2016 p. 695). The PPB cohort average for Year 1 Anatomy was 78.58 compared to the class mean of 80.96. The PPB cohort average for Year 1 Histology was 81.17 compared to the class mean of 83.44. There were seven Year 1 Anatomy failures and nine Year 1 Histology failures. No PPB participant failed either course. The previous

PPB cohort who beta-tested the ILP had a failure in each course. Over the last fifteen years, previous PPB cohorts had failures in one or both courses. From a programmatic point of view, no failure in the two introductory courses is a major unprecedented success.

PERCEIVED VALUE

The entire cohort reported that the ILP provided an opportunity to practice skills that needed improvement. Additionally, faculty and staff provided both feedback and support to the students. The ILP in this study was found to be easy to navigate and with little effort, students considered themselves skillful users. ILPs made students accountable for their work. There was no consensus on the worthiness of the ILP. Students were also neutral on its effect on school performance. Two students consistently provided evidence of working on their goals. Seeing the evidence provided an additional source of motivation for the students.

The perceived value of ILP use may be hard to measure or even capture. Many factors effect perception. Students were required to complete the ILP as part of the Psychology and Technology of Success course and a PPB program requirement. They also knew that their work on ILPs were part of a research study. As reported in the study results and Larsen et al., 2017, a student felt creating goals was "busy work." The majority of the students reported that the ILP provided a place to plan and plot, "to see what is possible when you stick to a plan" (Student 10). Six of the respondents reported that the ILP gave them the ability to evaluate performance. Four students reported the ability to assess and identify areas that needed attention. Overall students reported monitoring had a positive impact on their progress. This finding is in keeping with Stuart et al., 2005 "ILP helped to enhance their awareness of the learning process by helping them identify and discuss their needs with preceptors and by making teaching and learning a priority." (p. 299).

The process by which learning plans are implemented is important. Students and employees resist when requirements are mandated and thus viewed as bureaucratic with little educational value (Garth, Kirby, Silberberg, & Brown, 2016). Even when students fully embrace the process, it does not necessarily mean their performance will improve. Griffin & Hesketh (2004), report openness to experience has yielded consistently low correlation with job performance. Students need help making the connection between writing goals and tracking progress to overall progress in school. Student must perceive ILPs as serving learning and development needs (Beausaert, Segers, & Gijselaers (2011).

PPB students were given LASSI scores as a focus for developing skills related to success in medical school. Students chose areas of weakness to create ISMART goals. Students received monthly feedback in the one-on-one interviews with the learning specialist and in the ILP submission. The value of the ILP in a PPB program is as a feedback tool in an ongoing cycle of learning, feedback, adjusting, monitoring, and tracking. Feedback serves as method of assessment to help the student recognize desired goals, current progress towards desired goals, and understanding how to close that gap (Beausaert, 2013).

STUDY LIMITATIONS

The limitations of this study include both external and internal validity. The sample size is small and based on a pre-existing program. Results from this study may not be generalizable to other pre-medical post baccalaureate programs. Programmatic improvements to the overall structure of the program may challenge the internal validity. Those programmatic changes modeled both curriculum and staffing of the undergraduate medical education program at the Midwestern University School of Medicine. Students in this program were exposed to a significant amount of undergraduate medical education coursework, faculty, and pedagogical approaches in

the medical education. Students in this program had the support of a full-time personal counselor who to help navigate the hidden curriculum and non-cognitive aspects of starting a professional program. In addition, the program had a full-time learning specialist who provided one-on-one and group interventions. The participatory nature of this study (the researcher collecting and analyzing data) may also challenges the internal validity of this study.

SUGGESTIONS FOR FUTURE RESEARCH

Replicating this study with a larger sample size would allow for findings to be generalizable to other pre-medical post baccalaureate programs.

How to implement ILP use in undergraduate medical education still needs to be explored. One study found that weekly intervals had more impact on day to day work (Larsen et al., 2017). However, being able to integrate goal setting consistently into daily practice is challenging (Lockspeiser, Li, Burke, Rosenberg, Dunbar, Gifford, Gorman, Mahan, McKenna, Reed, Schwartz, Harris, & Hanson 2016). Depending on its size, a weekly review of ILPs would be labor and resource intensive. While some students may need that level of support, others may not. "Learning goals and plans must be implemented in a manner that influences practice in a continuing fashion.

Additional methods of assessment other than the submission of the ILP (Garth, Kirby, Silberberg, & Brown, 2016) should be explored. The ILP is both a process and a product. The process of putting together a learning plan is equally as valuable as the plan itself. A closer examination of the evidence gathering, assessing, and revising cycle could provide insight on performance improvement at the individual and programmatic level.

Future studies could also explore the strategies students use to track their progress successfully including formal tracking systems and planners (Li et al., 2011). These strategies may provide insight on student motivation and incentive to finish.

RECOMMENDATIONS FOR PRACTICE

Students

The academic schedule of classes for the PPB program is available on a shared Google calendar. Reminders to update the ILP as well as specifically timetabled sessions to discuss progress should be integrated into the calendar. Research by Li et al. recommends protected time for residents to complete ILPs. Additionally, a reflection prompt could be added to stimulate discussion and promote follow-up with the PPB program faculty and staff.

Faculty

Creating goals and generating strategies to accomplish those goals is challenging for students and residents. (Li et al., 2010; Hernandez, 2017). Providing partially written goals along with a list of available learning strategies may serve as an instructional scaffold for self-directedness.

Program Administrators

Shared goals may help reinforce team building, accountability, and confidence. From a programmatic point of view, incorporating shared goals into the PPB program would provide robust discussion around challenges and successes students encounter in the program and in preparing for medical school.

Based on students' suggestions to improve the ILP process, providing metrics or dashboards to visually display progress toward goals should be explored. Knowing the distance from a goal, or the proximity to being finished could serve as a powerful incentive to persist.

The exploration of a learning management system (LMS) or a different application to create, track, and monitor ILPs should be explored. *Pedialink*, the portal used by pediatrics residencies to record and update ILPs could provide a structure for how to implement ILPs electronically.

APPENDIX A: PREVIOUS EDUCATIONAL EXPERIENCE

This questionnaire will be used to collect information on student's previous experience in education. This questionnaire will not be used to identify any specific individual or problem. **Kindly select the correct response.**

High School		
I received tutoring in high school.	**Yes**	**No**
I provided tutoring while in high school.	**Yes**	**No**
I participated in study table or study hall in high school.	**Yes**	**No**
I used academic support services in high school.	**Yes**	**No**
I regularly talked to my teachers about assignments, projects, or exams in high school.	**Yes**	**No**
I have taken the Learning and Study Skills Inventory (LASSI) in high school.	**Yes**	**No**
I have failed a course in high school.	**Yes**	**No**
I was on the honor roll in high school.	**Yes**	**No**
During high school, I used a tool called any of the following: learning contract, individualized learning plan (ILP), individualized development plan (IDP) or individualized education plan (IEP).	**Yes**	**No**
College		
I received tutoring in college.	**Yes**	**No**
I tutored in college.	**Yes**	**No**
I participated in study table or study in college.	**Yes**	**No**
I used academic support services in college.	**Yes**	**No**
I regularly talked to my instructors about assignments, projects, or exams in college.	**Yes**	**No**
I know my learning style or preference.	**Yes**	**No**
I took the Learning and Study Skills Inventory (LASSI) in college.	**Yes**	**No**
I failed a course in my undergraduate studies.	**Yes**	**No**
I honored a course in my undergraduate studies (90% or A).	**Yes**	**No**
During college, I used a tool called any of the following: learning contract, individualized learning plan (ILP), individualized development plan (IDP)or individualized education plan (IEP).	**Yes**	**No**

APPENDIX B: LASSI MANUAL

http://www.hhpublishing.com/LASSImanual.pdf

APPENDIX C: INDIVIDUALIZED LEARNING PLAN

ILP	This document is designed to help you articulate, plan, track, and monitor your progress transitioning to medical school.
Specialty Interest(s)	
Fellowship(s)	
Additional Training	
Talents or Strengths List 3-5	What are my talents and strengths?
  List 3-5	What knowledge or skills do I need to enhance?
Self-reported weaknesses List 3-5	
LASSI (Learning and Study Strategies Inventory) is a tool designed to help students learn more about their study attitudes and see how well they use study and learning strategies in ten (10) different areas. Scores **between the 50th and 75th** show some positive learning attitudes and use of effective study strategies but also indicate some possible concerns. **Scores below the 50th** percentile mean that this area needs attention.	
Your results	**Areas at or below the 50th percentile** **Areas at or between 75th and 50th percentile**
Focused ILP objectives and action steps	What goals do you have for the next few months leading to the completion of the Post Baccalaureate program?
Based on the information you have gathered on this sheet, draft 2-3 goals to work on by the end of the Post Baccalaureate Program on the following page. What specific actions will help you achieve these goals? Remember to create ISMART goals.	

#	Goal	Strategies and Resources	Evidence of Achievement
1			
2			
3			
4			
5			

Meeting Date	Progress toward goal	Feedback (suggestions for improvement; things to work on new goals
	Goal # _____ **Accomplished** ☐ **Continued** ☐	
	Goal # _____ **Accomplished** ☐ **Continued** ☐	
	Goal # _____ **Accomplished** ☐ **Continued** ☐	Page 3 of 3

Monthly Tracking Progress

APPENDIX D: PERMISSION GRANTED

Saturday, November 12, 2016 at 2:52:05 AM Eastern Standard Time

Subject: Re: ILP form
Date: Sunday, March 13, 2016 at 6:29:45 PM Eastern Daylight Time
From: Elizabeth Stuart
To: Leah M. Robinson

Sounds good. Thanks. Elizabeth

On Mar 13, 2016, at 2:13 PM, "Leah M. Robinson" <lrobinso@wayne.edu> wrote:

> Elizabeth,
>
> I hope that this email finds you well. I would like your permission to use this format for my work with premedical post-baccalaureate students as well as dissertation topic. I would like to combine the format with the general format used with the IDP at WSU.
>
> If you have any questions or concerns, please let me know.
>
> Leah Robinson
> 313.658.9654 (cell)
>
> ---
>
> **From:** Elizabeth Stuart <aestuart@stanford.edu>
> **Date:** Tuesday, December 1, 2015 at 2:04 PM
> **To:** Leah Robinson <lrobinso@wayne.edu>
> **Subject:** Re: ILP form
>
> Hi Leah,
>
> I've attached an ILP form and a Progress Report form. (Nothing fancy.) Let me know if you have questions.
>
> Thanks
> Elizabeth

Saturday, November 12, 2016 at 2:51:37 AM Eastern Standard Time

Subject: Re: Adapt WSU IDP
Date: Thursday, March 17, 2016 at 10:34:55 PM Eastern Daylight Time
From: Andrew Feig
To: Leah M. Robinson

Hi Leah,

I gave you verbal permission earlier today but understand that you would like it in writing. Yes, you may absolutely adapt the WSU IDP to your study…

Andrew

****

Andrew Feig, Ph.D.
Associate Dean of the Graduate School
Professor of Chemistry

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email: afeig@chem.wayne.edu

http://chem.wayne.edu/feiggroup/

****

From: "Leah M. Robinson" <lrobinso@wayne.edu>
Date: Thursday, March 17, 2016 at 1:51 PM
To: Andrew Feig <afeig@chem.wayne.edu>
Subject: Adapt WSU IDP

APPENDIX E: MONTHLY MEETING QUESTIONS

1) Identify the barriers to achieving your learning goals?

2) Identify strategies for achieving your learning goals?

3) What can we do differently? (Last month of interviews)

APPENDIX F: PERCEPTIONS, ATTITUDES, AND PROGRESS ON ILPS SURVEY

Perceived Ease of Use	1 Strongly Disagree	2 Disagree	3 Undecided	4 Agree	5 Strongly Agree
I find the OneNote ILP cumbersome to use.					
Learning to navigate the ILP is easy.					
Interacting with the ILP is often frustrating.					
I find it easy to get the ILP to do what I want it to do.					
The ILP is rigid and inflexible to interact with.					
Interacting with the ILP requires minimal mental effort.					
I find it takes a lot of effort to become skillful at using the ILP.					
Overall, I find the ILP easy to use.					

Perceived Usefulness	**1 Strongly Disagree**	**2 Disagree**	**3 Undecided**	**4 Agree**	**5 Strongly Agree**
Using the ILP improves the quality of work I do.					
Using the ILP gives me greater control over my goals.					
The ILP enables me to accomplish my goals quicker.					
The ILP supports critical aspects of my role as a post baccalaureate student.					
Using the ILP increases my productivity.					
Using the ILP improves my school performance.					
Using the ILP allows me to accomplish more goals than would otherwise be possible.					
Using the ILP enhances my effectiveness in achieving my goals.					

Using the ILP makes is easier to accomplish my goals.					
Overall, I find the ILP useful in accomplishing goals.					

Attitude Towards ILP	**1 Strongly Disagree**	**2 Disagree**	**3 Undecided**	**4 Agree**	**5 Strongly Agree**
ILPs are worth the time and effort spent on them.					
I am willing to invest the time and energy necessary to develop and implement an effective ILP to improve my performance.					
ILPs help me align my learning goals with my learning needs.					
ILPs help me plan how to best achieve my learning goals.					
ILPs help me document my progress toward achieving my learning goals.					
ILPs hold me accountable for achieving my learning goals.					
ILPs promote lifelong learning.					
I have to develop an effective ILP (self-assess, develop goals, develop plan).					
I have time to follow through with my learning plan.					
I have faculty and staff support to help me follow through with my learning plan by observing me and providing feedback.					
It is difficult for me to remember to work on my learning goals on a regular basis.					
I have a system to track my progress on achieving my learning goals.					
I track my progress on achieving my learning goals.					
I have opportunities to practice areas which I need to improve.					
My goals are constantly changing.					

Progress Towards Goals	**1 No progress**	**2 A little progress**	**3 Some progress**	**4 A significant amount of progress**	**5 All goals were met**
On average, how much progress was made on your goals?					
How much progress was made on the most important goal?					

In what ways was an Individualized Learning Plan (ILP) helpful?	
What were the advantages to using an ILP in the PPB program?	
What problems did you encounter?	
Suggestions:	

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ABSTRACT

INDIVIDUALIZED LEARNING PLANS AND PERFORMANCE MEASUREMENT, MANAGEMENT, AND IMPROVEMENT IN PRE-MEDICAL POST BACCALAUREATE EDUCATION

by

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December 2018

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Medical performance, what a physician can do accurately, repeatedly, and consistently is more significant than what they know. "Regardless of training, experience, or education, roughly 7% to 28% of medical trainees will require remediation in the form of an individualized learning plan to achieve competence" (Guerrasio, Garrity, & Aagaard, 2014, p. 352). Very little research on remediation for medical students, trainees, fellows, or practicing physicians exists in the literature. The available research focuses on specific skill attainment but lacks a standard methodology for identifying 1) those who are not competent and, 2) remediation strategies necessary to close deficiencies (Hauer, Ciccone, Henzel, Katsufrakis, Miller, Norcross, Papadakis, & Irby, 2009).

Identifying self-regulating processes and their application to teaching and learning in clinical and academic medicine is also missing in the literature (Sandars, 2012). Research suggests individualized learning plans (ILPs) increase accountability from both educational and governmental institutions on program outcomes and competency assessment (Irby & Wilkerson, 2003). Graduate programs funding students through National Institutes of Health (NIH) and

National Science Foundation (NSF) support are required to submit IDPs as an annual performance appraisal and evaluation. The ILP has five components: 1) self-assessment of strengths and weaknesses as well as a reflection of career goals; 2) generation of goals; 3) a plan to achieve goals; 4) assessment of progress towards goals and; 5) revising goal or plan based on the assessment (Li & Burke, 2010c).

The general purpose of this mixed-method design is to document and explain the process of developing individualized learning plans and the outcome of their use through the lens of continuous performance improvement and evidence gathering (Guerra-López & Hutchinson, 2013) for students in a premedical post-baccalaureate program.

Findings show that premedical post-baccalaureate students encounter similar challenges and successes with individualized learning plans as residents who use ILPs to complete medical training and practicing physicians who use ILPs to maintain licensure.

Keywords: individualized learning plans, premedical post baccalaureate, performance monitoring, performance measurement, performance improvement, self-directedness, self-regulation, self-assessment

AUTOBIOGRAPHICAL STATEMENT

Leah M. Robinson is the Director of Academic Support in the School of Medicine at Wayne State University. Her work with students focuses on improving and sustaining academic performance. Her career in higher education includes teaching, advising, and counseling a wide variety of student populations that span from summer bridge to medical residents. Leah has taught a variety of courses including learning to learn, college survival skills, educational psychology, and anthropology at the University of Michigan, Eastern Michigan University, Wayne State University, and Zayed University in Abu Dhabi, United Arab Emirates. An early adopter, Leah integrates learning theory with technology and evidence-based practices that has resulted in securing grants to explore the use of mobile devices in medical education, summer language retention, concept mapping, and instant diagnostic feedback for college writing. Her additional interests include universal design, social justice, and curriculum development with an emphasis on intervention and retention. She has facilitated numerous workshops for faculty, staff, and students on interactive teaching approaches, equity and inclusion, and mobile technologies.

Leah Robinson is the Operations Manager for COOL School Technologies, L3C, an educational training and content provider and recipient of a WSU Entrepreneurial Excellence (E2) Challenge award. She holds a B.A. in English and Education from the University of Michigan, a M.A. in Educational Psychology from Eastern Michigan University, and an Education Specialist Certificate in Instructional Technology from Wayne State University.